

# COMPUTER WORLD

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## Burroughs Adds B4700, Mini Series

By Michael Merritt  
Of the CW Staff

**DELRHIE** In a flurry of announcements last week, Burroughs introduced a new medium-to-large-scale processing system, a series of accounting minicomputers, and two system peripherals.

The B4700, according to Burroughs, is more than twice as fast as the B3500 when executing Cobol programs and from 6 to 20 times as fast on Fortran programs.

The B4700 maintains Burroughs' modular approach and systems can be configured with from one to four central processors, 8 to 80 I/O channels, and 100K bytes to 500K bytes of main memory per processor.

### New Disk and Tapes

The new products include a dual density disk drive capable of storing a maximum of 1.7 Tbytes, and two new on-line tape drives.

The B4700 uses an updated version of the Master Control Program (MCP) and is code compatible with the B3500s and B3600s.

Burroughs also offers a data protection memory which allows independent central processors to share local per track disk files. The feature also provides protection against multiple programs from one processor controlling identical records in a

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## CW Road Show Planned

### Conference to Come to Users

By a CW Staff Writer

**BOSTON** Computer users seldom have an opportunity to attend a national computer conference, so *Computerworld* next year will bring a traveling conference to the users.

The three-day computer Users Forum and Exhibition will visit nine major cities, making it possible for every professional DP staffer to attend at least one day, said Patrick J. McGovern, *CW* publisher.

The tour will begin here Feb. 22, he said, and will continue across the country, eliminating the need for users to spend up to a week away from work in order to participate in a major national conference.

"In a real sense," McGovern

said, "this will be the first time that the bulk of the DP managers and professional computer users will have a chance to attend a show with national characteristics."

Each site's three-day meeting will include forums or panel discussions on the morning, followed by workshops, a lunch conference, and exhibits.

Nationally prominent speakers will keynote each day session. Regional users with state-of-the-art equipment, or who are known for their "progressive management principles," will participate in the panels, then conduct individual workshops, according to Executive Editor Robert M. Patterson.

The afternoons and evenings

will be devoted to the exhibits, which will offer users a chance to try out equipment and ques from the vendors.

Besides the do-it interface at the booths, vendors will probably take prospective customers to test installations in the area, according to McGovern.

The exhibits will be essentially identical in all locations since vendors must sign up for the entire tour (*CW* Oct. 10).

McGovern announced *Computerworld* has retained the services of one of the country's most experienced planners of computer conferences, H.C. "Baltic" Assmus, who joined the company as general manager of the forthcoming *Asimov*.

He is the first executive secretary of the American Federation of Information Processing Societies and helped develop over a dozen joint computer conferences.

After Boston the tour continues to New York, Washington, D.C., Atlanta, Dallas, Los Angeles, San Francisco, Chicago, and Detroit.

### Key Topics

Each day, the forum and workshop will be devoted to one key topic of concern to users, with the ultimate goal of improving efficiency of operation, according to Patterson.

The "hot" topics might include keyphrase replacement or data entry, communications, and independent peripherals, he explained.

The decision to present a forum rather than formal papers was made after last summer's highly successful round-table discussion in Boston, when users examined the various problems and advantages of keyphrase replacement. Publication of the concluding installment of that meeting appears on page 6.

## IBM Rent Increases Suspended

By Edward J. Bride  
Of the CW Staff

**WHITE PLAINS, N.Y.** IBM has "suspended" its rental and maintenance increases for the moment at least, in deference to the President's policy on price controls.

Purchase price increases for IBM 370s, announced and effective July 28, however, will remain in effect, the company revealed last week, adding the federal Office of Emergency Preparedness had "confirmed" that these purchase price increases comply with the President's executive order.

The company "emphasized" that a minor portion of its customers rent their DP equipment and would have at least until Nov. 13, the end of the 90-day freeze, before experiencing any increase. The July '84 announcement on rental and maintenance increases was to have been effective Nov. 1.

IBM said it considered its July '84 announcement as adequate notice under the 90-day provision of its standard contracts, and might not give another 90-day notice if and when these increases are implemented.

The rental/maintenance increases are "suspended" and not cancelled, the company cautioned.

### Protection Clause

Customers who had ordered 170s for purchase received them at the old prices until Tuesday, when the 90-day protection clause expired. Under this provision, price increases for purchased systems are not enforced until the effective date of the increase (in this case July 28) is 90 days past.

The IBM announcement removed most of the uncertainty.

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## RCA Sends Second String to CUA

By a CW Staff Writer

**MARLBORO, Mass.** RCA officials said last week they would attend the RCA Computer Users Association (CUA) meeting this week to review and clarify RCA's customer support policies. Data Processing Division president Joseph Rowney said though, that his statements at the meeting would not be intended to displace or supersede individual negotiations with users.

In a letter to the RCA CUA President David Rau, Rowney also said RCA will continue to provide administrative and financial support for the meeting.

Rau said he was disappointed that RCA would not enunciate new policies at the meeting, and that RCA would not be repre-

sented by someone on the policy-making level.

Roney's report to E.F. Dineen, RCA vice-president and general manager of the Computer Systems Group, who in turn reports to RCA President and Chief Operating Officer Anthony Condit.

### RCA Response 'Arrogant'

"We need to hear someone from RCA who can speak for the company," Rau said. He called RCA's response to his request for such a speaker "arrogant."

Roney's letter was in response to a letter from Rau to Condit asking, among other things, that RCA make definite commitments to user support at the CUA's meeting (*CW* Oct. 13).

The RCA letter indicated the firm will develop support policies through negotiation with each customer, the user group wanted a clear statement of sup-

port policies that would be followed for all customers.

As of last week, registration for the meeting scheduled to begin Oct. 25 was over 350, according to Rau, who expected total attendance would be more than 600. Industry sources estimate there are RCA computers at some 1,000 sites.

RCA CUA Vice-President Beth Rothstein said last week the program of special interest group meetings would be rearranged to give time for RCA representatives to talk with small groups. Rothstein is president of Matketline Corp., which is a lessor of RCA mainframes. When asked how the individual negotiations were going, Rothstein said the RCA salesmen are treating the situation "like a new product line announcement they're selling as much as they can. The feeling I get from RCA is we're going out of business, but that doesn't change anything."

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# Parents Get More Involved With Career Plan System

FLINT, Mich. Job conditions and environments facing high school graduates are described and visually portrayed by an experimental computer system, in tandem with video displays. The unit has been tested here since January, and was recently expanded to ten high schools.

The Education and Career Exploration System has been received well by a vast majority of students, and has had the unexpected side effect of increased parental involvement in career planning.

During the first semester of the trial, 95% of the students polled said they benefited from using

the system, and 71% of their parents said they had become more involved in their children's career planning.

The career information program enables users to investigate educational requirements, including high school, collegiate, or technical courses for certain jobs, as well as working conditions in any of 400 vocations.

Columbia University is currently evaluating the extended use of the program, to determine how such systems can help guidance counselors, as well as the students. The test is being conducted by the Geneva Intermediate School District (GISD).

and the system has also been demonstrated by IBM, which designed it.

To operate the system, a student calls up information to the screen of an IBM 2760 Optical Image Unit by using an electronic probe. The typewriter keyboard of an IBM 2740 communications terminal is also used to request information on majors or courses of instruction. Both terminals are linked by telephone lines to a remote 360/50, at IBM's Mohawk Systems Laboratory in Yorktown Heights, N.Y. The system includes four libraries of data stored on disk files and film. An "occupations" file illus-

trates in color some 400 vocations, 18,000 film images. Pictures and text define the occupation, show people at work, describe individual activities performed, ask questions about the work, and indicate working conditions, chance for advancement, personal and educational requirements, and starting salary.

The "majors" file describes about 400 areas of study found at the university, college, and technical school level. It also lists the high school courses that

are required for particular majors, and what courses are required once a student enters an institution of higher learning.

Details on more than 6,000 individual courses can be called up by the user.

The "charts" section lists other fields the student has not yet explored, but which are related to occupations and majors previously investigated. It also enables the student to receive summaries and analyses of each vocation and major reviewed.

## Burroughs Adds B4700, Peripherals and Mini

(Continued from Page 1)  
common data base, Burroughs said.

The revised MCP includes new Fortran and Basic, and a remote job entry package.

### Multiprogramming

The operating system offers multiprogramming and multi-processing, virtual memory, and dynamic allocation of resources. Operator-activated reconfiguration permits an operator to switch peripherals from one CPU to another at the console.

The memory cycle time is 500 nsec per 2 byte word, twice that of the B3500. The address memory has a 50 nsec access time.

Burroughs also announced a dual density disk drive capable of storing 242 Mbyte/drive. The unit has an average access time of 30 msec, average latency of 12.5 msec, and a data transfer rate of 6.25 kbyte/sec. The drive uses IBM 2310-compatible disk packs.

A data communication processor provides line control for 16 to 64 channels. The processor has from 16K to 32K core, and several of them can be attached to a CPU.

A series of 1,600 bit/in. phase-encoded tape drives give data transfer rates of 320 kbyte/sec and 400 kbyte/sec, and a 725 line/min. to 1,100 line/min. line printer offers self-align format control capability.

A new CRT display console is also optional for the system, which offers faster communication between the operator and the master control program, as well as providing more complete status information than possible with a printer.

Purchase price for the B4704, with one processor, 100K of memory, eight I/O channels, and console is \$325,440. Adding file protect memory and two I/O channels to this configuration makes it a 4711, which costs \$403,862.

A 4712, with two CPUs, 200K, and 18 I/O channels is priced at \$731,320. With three CPUs, 300K, and 26 I/O channels, the 4713 costs \$1,087,680, and the four processor, 400K, 34-channel 4714 costs \$1,433,640. Additional 50K increments of core each cost \$40,000.

Burroughs also added three accounting minicomputers, the L7000 series, to the L family of accounting machines.

The largest of the three models, the L7500, uses magnetic stripe ledger cards, which Burroughs has christened magnetic memory records. The ledger cards have either one or two magnetic tracks, each of which can store 352 digits.

The L7400 and L7300 have 26 in and 15 in forms handlers respectively, which is the only difference between the two. They cannot process mag stripe cards.

The L7000 series differs from earlier L machines in increased processing speeds, and greater internal memory. The semiconductor memory ranges from 2,560 words to 8,704 words.

The new machines can run the application programs developed for previous L models without alteration. The applications packages are priced separately from the minicomputer hardware.

Micrologic applications programs, and data are all stored in the main memory. Programming is done by card, paper tape, or edge punched card input. Programming can be done in Cobol and compiled on a larger Burroughs computer.

Prices for the basic min and forms handlers are \$15,000 for the L7300, \$16,400 for the L7400, and \$26,900 for the L7500 with mag card reading capability. The card reader costs \$2,120, the paper tape reader \$965, and the card and tape punch \$2,165 with controller.

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# Old DP Tapes Valuable for Blind

DOWNEY, Calif. — The blind can buy a 1,800 ft reel of 1-mil recording tape for \$1, rather than \$5, through an organization that recycles computer tape, Tapes for the Blind, Inc.

The two year old organization takes donated computer tape, 1 in. or 1/2 in. wide, and dits it into 1/4 in. width for use on audio tape recorders. The blind use the tape for a number of purposes, including recording of textbooks.

## Non-Profit Organization

Tapes for the Blind is headed by Orzlie Rudloff, who has been blind the last five years. Rudloff described the organization as non-profit, self-supporting, and staffed completely by unpaid volunteers.

"The man thing we need now

is 1 mil tape," Rudloff said. "We have a large reserve of 1-1/2 mil, but the 1 mil supply is short." The 1-mil tape allows the organization to ship 1,800 ft of tape on a 7 in. reel, rather than 1,200 ft with 1-1/2 mil.

George Baumgardner, an aerospace engineer, designed the equipment that dits the tape into 1/4 in. widths, he said. The organization has been using sufficient ditting machines, but needs more rewinding equipment, Rudloff added.

## Free Postage

The government provides free postage for the tapes, and the only out of pocket expenses are for reels, shipping boxes, and office overhead, he noted.

Tape that can no longer be certified for data storage is still

quite acceptable for audio recording. Donations to Tapes for the Blind are tax deductible, Rudloff said.

The organization has shipped tape to every state in the U.S. in the last two years, and 15 foreign countries as well. Tapes for the Blind was started as a project of the Downey Lions Club, but after the club's initial grant of money, it has been self-supporting.

Tapes have been donated by various businesses and government agencies, including North American Rockwell, Northrup, McDonnell Douglas, Edwards Air Force Base, Naval Sea Systems Command, and the Long Beach Naval Supply Base.

Tapes for the Blind is at 12007 S. Paramount Blvd., 90242.

# OEP Confirms IBM Purchase Increases

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regarding the company's price policy, there had been much speculation regarding the fate of purchase customers, since the company had consistently declined comment on purchase business between its July 28 increase and the Aug. 15 freeze.

One possible reason IBM was able to keep its purchase price increase, a spokesman related, was that some leasing customers may have changed their purchase arrangements and purchased

already installed computers at the higher price (possibly to avoid the November lease increase).

## Federal Guidelines

Federal guidelines state that, in order for a price increase to remain effective, a company must have done "substantial business" at the increased rates in a base period of 30 days preceding the Aug. 15 presidential announcement.

An official of the Office of Emergency Preparedness explained, however, that if price increases were announced during that period, then the "base period" commences on the date of

the announcement.

In other words, the spokesman continued, IBM's base period would have commenced July 28, and the required purchase "business" could have been conducted by users changing from lease to purchase arrangements. Another way IBM could have installed systems at the higher price without restriction by its 90-day protection provision in the purchase contract, the company said, would be if a user tentatively ordered a leased system, then changed to a purchase arrangement before the system was delivered but after the increase was announced, or between July 28 and Aug. 14.

# 'Voice' Gives Weed Control Tips

FAST LANSING, Mich. Computer-generated, text response units at a dozen Michigan Cooperative Extension Service county offices are helping farmers solve soil fertilization and weed control problems.

By inserting specially punched cards indicating the farmer's problems and related factors into the phone within 10 seconds, a "not very sexy, but always right" feminine-like voice gives recommendations.

The program is part of Michigan State University's computer-based Telfarm program, run by the Department of Agricultural Economics.

To prepare a card about weed

control, a farmer answers questions about soil type, previous crop, crop to be planted both this year and next, and predominant weed problems.

Recommendations include the kinds of weed control chemicals to use, how much to apply per acre, and the approximate costs of enough to cover the intended acreage.

## Where Is the Money?

FRANKFORT, Ky. A computerized information system for banks is being organized by the state banking department. The system is designed to show where money is in all financial institutions.

# News Wrapup

## Budget System Planned for Congress

WASHINGTON, D.C. — The Comptroller General's staff is surveying the fiscal and budgetary information requirements of congressional committees and individual legislators preparatory to the development of a standardized fiscal information and DP system, Rep. Jack Brooks (D-Texas) disclosed.

Standard classifications for federal programs, activities, receipts and expenditures will be developed as part of the program.

The majority of congressional budgetary and fiscal information needs must be filled from the executive branch's information systems. If these systems are designed to provide the types of information the Congress wants, the Congress will be able to get timely, relevant and reliable information in the forms desired," according to a fact sheet from the General Accounting Office.

## Computer Helps Predict Success of Surgery

VANCOUVER, B.C. — Doctors at Vancouver General Hospital here are calling in a computer for consultation to assess surgical risks faced by individual patients. With a record base of information compiled from 659 patients who had a total of 810 operations at the hospital over a three year period, a computer at the University of British Columbia is fed data such as patient's age, sex, medical condition and such information as whether the patient smokes or has high blood pressure.

"The computer provides a complete breakdown of how other patients with exactly the same conditions have fared under surgery and what the risks are," explained Dr. Henry Litherland.

## Pollution Simulated at Pittsburgh School

PITTSBURGH, Pa. — A computer-based air pollution game is being designed by a team of faculty and students at Carnegie-Mellon University.

The game, which is expected to be developed by the end of the year and made available to schools around the nation, will be applicable to a variety of undergraduate courses dealing with environmental problems.

"After grappling with the complexities of a simulated air pollution problem and devising a satisfactory solution, students will be much better prepared to tackle a real problem and learn from industrial and regulatory personnel," said Dr. J. Kelly.

The project is supported by a \$25,000 grant from the ESO Education Foundation.

## Labor Uses Registration Lists for Politics

NEW HAVEN, Conn. — The Connecticut State Labor Council is planning to use a computer to strengthen organized labor's effectiveness in political campaigns. By culling and correlating voter registration lists, officials hope to compile accurate voter registration lists by district. When a local labor council endorses a candidate, canvass workers can then use a computer printout listing prime voter prospects in their districts.

## Rule Britannia—But Watch Those Wickets

LONDON — Englishmen who watched in amazement as computerized football, boxing and baseball matches were fought by historical contestants are now being presented with something a little closer to their hearts. Last month in London an NCR computer began what may well prove to be the only test of many computerized cricket matches. The "Test Match" was fought between teams selected from the best players over the last 50 years from England and Australia, and many of these players were present at the start of the match.

The true fans could watch, on a video display unit, a simulation of each phase of the match as it was played.

Fans scandalized at the thought of the computer intruding on such an essentially English province may be mollified by the thought that the NCR London head office is less than a mile away from Lords, the headquarters of English cricket.

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## Keypunch Replacement Forum - Part IV

# Users Exchange Views on Internal Control Problems

In the first two parts of the Computerworld User Forum on keypunch replacement, users justified replacement of keypunch equipment and their choices of appropriate systems.

Discussion in Part III was concerned with users' conversion problems and their solutions.

The last article in the series, Part IV, centers on internal control problems involving data control, drum dumping and maintenance, as well as remote entry and retrieval and applications.

**CW:** Did any of you have trouble with your internal control procedures when you went with key entry?

**WINSHIP:** The only problem we had was our methods right within keypunch itself. We had a data control section where everything was logged in and logged out, but our basic problem was just in the methods, rather than the keypunch.

**MORLEY:** Did you control section exist prior to conversion?

**WINSHIP:** Yes, we had it pretty well controlled. I think Mr. Noah will probably hear me out. I think that you'd better have it well controlled. [You need] to know what's going in to make sure that's what comes out. Because it's very easy to leave one of those betches just sitting on a drum.

**NOAH:** And to wipe it out, too. Once you've released a batch to the drum, it's gone. It's there on the tape actually, but you can't pull it off.

**LAWTON:** I make two tapes of everything.

**NOAH:** We do a drum dump now. I don't know if it's every night or every Friday night.

**WINSHIP:** Ours is every day.

**NOAH:** I do every night with us, too.

**LAWTON:** Do you go with one tape?

**WINSHIP:** Yes, but we do it on the drum once per shift. So we do have backup.

**LAWTON:** But you have a two-shift operation, and I only have a one-shift operation, so what we get out at four o'clock on tape goes into the second shift [computer operation], and there's nobody there to make a tape. So I have to back up my tape just in case I get a data check.

**NOAH:** I have a one-shift operation, and the machines are up from Monday morning to Friday night. We don't turn them off. The service men have told us that, as far as the drum is concerned, it takes less out of the drum to let it keep going than it does to start it and stop it.

**LAWTON:** Ours flies all the time. We have it going constantly, never shut it off.

even on weekends.

**TIERNEY:** There is another good reason for taking a drum dump. When you take a drum dump and put the tape back on the drum, you get rid of the checking effect on the drum. You can pick up a lot of space that way, too.

**NOAH:** One of the features I've looked for on key-to-magnetic equipment is this ability to bypass the disk or the drum since that is the most mechanical piece of equipment in the whole thing. That is the most likely [component] to go down and if that goes down, you are dead. Key-Edit does not offer this feature. If you are down, you're down. There's no going to tape. With some of the others, for example, CMC and Honeywell Keyplex, if the disk goes down, you can enter on tape, dump the tape and then sort it on disk and write out on tape. But here again, the drum is more reliable than tape because the disk has more moving parts.

**LAWTON:** Key-Logic has a disk with a fixed head. That's one reason why I like the hardware on it. There is no [head] movement at all. It is a Burroughs disk that is sealed in so you never have to clean it. One of the reasons why I liked it was because of the fixed head.

**NOAH:** From today on I will be able to go beyond my 80-character record and go up to 240 characters.

Unfortunately the software is such that to go beyond, I must go in units of 80 characters. I am actually going in units of

## Remote Entry and Applications Discussed by Users

**WINSHIP:** Does anybody have any requirements for remote entry?

**MORLEY:** I think that one of the eventualities of our application is that we are going to have to think in terms of remote entry and remote retrieval. One of the big problems that we have is we can't get to our information fast enough.

So this was going to be one of my questions: do any of you intend to use this equipment later as a communications-type unit?

**WINSHIP:** No, at Sylvania we are going the other way. We are solving each problem separately, which is sort of unfortunate but also necessary, because you have just so many resources you can put on it.

So even though you have the capability of making a communications processor or an off-line printer out of it, it hasn't worked that way for me. I have Mohawks doing data transmission. I have an off-line printer doing printing, and I have a data entry system.

two. Even numbers, 82, 84, 86, etc. But if I go to 82, I waste 78. It has to go up on 80-character buffers, so I waste an awful lot of space.

Another thing, I have a small drum that will hold the equivalent of 8,800 cards. I have a job which I am putting on now which has 138 character records and will run about 5,000 items. That would use up the whole drum. I have had to put in an order for a larger drum.

**WINSHIP:** We put in a big drum. We put in the million-four.

**NOAH:** We have that on order. Just as soon as we went to the larger record, I put that on order.

**LAWTON:** See, this is another good reason why we went Key-Logic. You've got everything in one package. No options.

**BABIN:** How about the expanded character? Do you have to pay extra?

**NOAH:** That normally calls for an extra 4K memory. But I had to get the 4K memory to accomplish the calculations that I wanted to do. And I can use that same 4K for the expanded fields. By the way, my equipment has gone up to 24K now. They put in another 8K over the weekend.

**LAWTON:** This disk of Key-Logic is two-million characters, and it has a 32K computer.

**NOAH:** I was surprised to find out about two weeks ago that something I had assumed was possible turned out to

be. But we do have four keyboards we are attempting to put in our traffic department and run them remotely, from one end of the building to the other.

**LAWTON:** Do you have a data pool or is it actually hard-wired?

**WINSHIP:** It will be hard-wired. It isn't today. They look like and what to expect, and they have given us an extra mainframe. Today we have two Key-Edit systems and [we're] only paying for the extra guys with two to three weeks they expect to have solved whatever the problem is in getting the signal over the lines. But it is going to be hard-wired.

**MORLEY:** Doesn't this type of system facilitate the ability to put the data input responsibility back to the user?

**WINSHIP:** Yes. We are putting four keyboards in our traffic department, and they are responsible for their own input. It makes sense, because they are familiar with their freight bills. This is all they work on eight hours a day. They know exactly what they look like and what to expect, and they can make some intelligent decisions right at that point of input. My girls in the centralized area couldn't do that. That's why we were curious if anybody else had any experience with it.

**LAWTON:** We are going to put terminals in the field. We'll probably have 50 or 60 out there before we're through. We are going to use the Key-Logic as backup. If a terminal has too many transactions, or if a terminal breaks down, or telephone lines or the microwave breaks down, they can ship the stuff to us, and we can put it on Key-Logic. The reason we decided to do this instead of using cards is because with cards you are limited to 80-character messages. With Key-Logic I can go to 400 characters per message. We have already built the simulator and we will simulate tape for a terminal and let it go into the computer that way.

**CW:** Are there any applications that are especially suited to key-to-disk systems?

**NOAH:** Volume wise we only have one job that is big enough to worry about. We make out about 20,000 to 25,000 bills a week, and we put them all out at one time, Wednesday or Thursday night.

be not possible, and I was quite shocked. They could peel off from the drum to a tape, but you can't take that same tape and put it back on the drum.

**TIERNEY:** Unless you take a complete drum dump.

**NOAH:** Right. But I didn't realize that. I was very surprised. I hollered my head off a couple of weeks ago, and they're doing something about it. They're writing software. I don't know how they've gotten away with it for so long. I can't conceive of being able to take something off the machine and not being able to put it back very simply.

To do a drum dump, all your keyboard operators have to close out all their records. [After you] take the drum dump, you have to start up. When you're ready to actually manipulate that data, make corrections, you have to stop again and take a drum dump and you have to read back up to the original drum dump, make your corrections, and then put back the one that they had so you can get back on the air. It's very bad, and I'm not at all happy about it. When I found out, I almost hit the roof.

**BABIN:** This is not true with Key-Logic. You can dump and the girls can still punch.

**LAWTON:** Providing you are on a different task. You can't dump while a girl is punching that task.

**BABIN:** Right.

Key-to-disk appealed to us because of the ability to check the crossfooting and to get the credit and debit figures right. Every day, we get the bills back in the next day.

**TIERNEY:** If you are creating source documents, other words, if the document you receive is not the one you end up processing, the application is a good one for key-to-disk.

But any time you can process a document in one way or another, if the application is an ideal candidate for OCR. It puts the responsibility for preparation back in the user's hands.

**NOAH:** I have one application now that has a possibility of having 22 different formats. It has a three-program level, Program 1, 2, and No Program. Some key-to-disk systems have unlimited format capabilities, and we could take this job and program it. Right now we are just punching it.

**LAWTON:** In our business, we have to do an awful lot of editing. Almost every card goes through an edit program. Our territory runs from the New York border to the Atlantic Ocean down into Rhode Island. Some of them are important to be made out in the field and we don't have the backup records in Westboro at the computer center. So errors either have to go back to the field to be corrected or someone has to get on the phone and get them corrected that way.

We feel that any job that you have to edit on a computer is a good application for key-to-disk, if there is enough volume. You find your error immediately. The machine looks up if you program it to edit all the different fields or characters you are looking for.

We have arrangements for the user departments to come in three times a day and pick up these bad transactions. They get them back to us before three in the afternoon. We correct them right on the spot, so when we go to the computer that night, those transactions do go through.

When you are dealing with 1,200,000 customers, it's kind of important to reach customer by her name is spelled right or that you have the credit on her bill for what she's paid. So we do a lot of editing.

## Meet the Participants

**ROBERT BABIN**, data input manager, American Mutual Life Insurance Co. His installation includes a H-800, an H-400, an H-820, 17 keypunches, nine verifiers, two Mohawk Data Recorders, three Honeywell Keytapes, and a Farrington 3030. He was one of the two users seeking more information to help him make a purchasing decision.

**EVERETT LAWTON**, manager of data processing operations, New England Power Service Co. His installation includes a 360/50, a 360/40, a 7010, two 1401s, a 1480, 22 keypunches and verifiers, and 16 Redcor Key-Logic (key-to-disk) stations.

**ARTHUR MORLEY**, assistant chief, Bureau of Analysis and Processing, Massachusetts Department of Corporations and Taxation. His installation includes a 360/40, a Univac 9200, and 113 keypunches and verifiers. He was the other user seeking more information to help him make a purchasing decision.

**SAMUEL NOAH**, manager of data processing, M&M Transportation Co. His installation includes a H-200/1250 and a Consolidated Computer Key-Edit eight-station system.

**DAVID TIERNEY**, systems engineer for hardware evaluation, State Street Bank & Trust Co. His installation includes a 370/155, a 360/50, two 360/40s, two 360/30s, 27 keypunches, 13 verifiers, and a CDC 915 page and document reader.

**LAWRENCE WINSHIP**, manager of data processing, GTE Sylvania Lighting Products. His installation includes two 360/40s and two Consolidated Computer Key-Edit systems (one with four stations and one with eight stations).

**Salaries Too Low****Missouri Department May Give Up DP**

JEFFERSON CITY, Mo. — Confronted with a state government strapped for cash, the Missouri Department of Revenue is exploring the possibility of turning over its data processing operation to a facilities management company.

An insufficient budget for the department has led to below average salaries for data processing personnel. This in turn has led to a high turnover rate. "Our data input people," said Richard Murphy, director of administrative services for the department, "make \$25 to \$30 a month less than they could at other agencies, and \$50 to \$75

less than they could in outside industry. The turnover rate for data input people is 49%."

Systems and programming people also receive below average salaries, Murphy said, but the turnover rate is not quite so severe in this area.

This turbulence was hurting performance, so Missouri has asked for bids from facilities management companies to take over the \$2.4 million a year operation. Bidding was closed Oct. 15.

The state will also retain an

outside consultant to evaluate the bids. Bid prices are frozen for 120 days, by which time the department hopes to have made a decision.

Murphy noted that Indiana's Department of Revenue made a similar move to facilities management successfully.

"By going to facilities management," Murphy said, "we hope to be able to let our managers manage, rather than spend their time worrying about how the data processing department is doing."

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## President Panel Studies Court's Computer Usage

WASHINGTON, D.C. — A presidential study commission has been given a year-and-a-half to appraise the use of computers by federal bankruptcy courts. Recommendations on the possible expansion of DP usage are anticipated.

One of the first projects of the commission was a visit to Chattanooga, Tenn., where computers are doing the repetitive tasks of statistical and analytical reporting, mailing of notices, and notifying vendors of parties in bankruptcy proceedings.

There are no immediate plans to computerize the court schedule, according to Claude Rice, president of Electronic Processing Inc. (EPI), the Kansas City (Kansas) firm which performs DP work for many local bankruptcy courts.

Computers are "not worth a damn" in court scheduling, since the input is the same as required by hand, and is usually a one-time entry, Rice said. But for indexing and cross-referencing, computers have his OK.

EPI has been performing various DP functions with its IBM 360/30, but most of the applications, Rice said, were "not very novel," since manual editing is performed before the entries get to the computer.

Nonetheless, nine federal representatives and company executives spent a week studying the "routine" DP operations of the Chattanooga court.

## Aussies Plan File On Traffic Crime

**Special to Computerworld**  
SYDNEY, Australia — Compilation of a file on every major traffic offender in Australia is a long term objective of the new Bureau of Crime Statistics and Research, now being established in Sydney.

Road safety authorities predict it could lead to a significant breakthrough in finding answers to Australia's heavy highway fatality toll, and in detecting repeated offenders and suspended drivers who can now move from state to state with relative impunity.

Similar files will be assembled on crime and criminals, first for New South Wales, and later for the whole of Australia.



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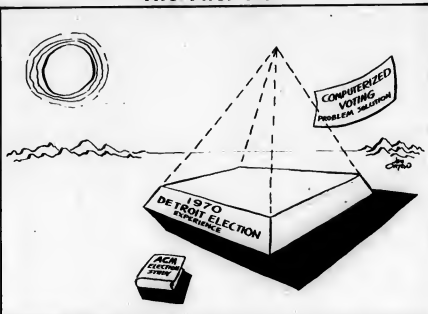
## Editorial

### It Takes Two to Deal

The debate over "what should be done about IBM" that was started by Joan Van Horn's viewpoint article two weeks ago has been an interesting—and healthy—turn.

This week, on this page and on "The Professional's Viewpoint" page, readers question the role the users have played in dealing with IBM.

The point is simply that it takes two to make a deal. And anyone who bought the wrong IBM system out of laziness or ignorance really has no one but himself to blame.



## Letters to the Editor

### Users Could End Monopoly by Letting Bids on Units

Among the several points suggested by Joan Van Horn (CW, Oct. 13), there are three which in my opinion require greater discussion and different emphasis.

First, she notes: "The wonder is that corporate computer users have not tried to have something done about IBM's monopoly position... They may see that something is wrong, but... are victims of the IBM mystique."

It is indeed a wonder, not that they have not tried to do something done, but that they have not done it themselves. The users may not be "sufficiently knowledgeable in data processing" but presumably they are knowledgeable in buying capital equipment.

Does a power company buy an entire generating plant from a single vendor? Does GM buy an entire assembly line from a single machinery manufacturer? Furthermore, who sets the specifications, the buyer or the seller?

In fact, IBM is not a monopoly in the production of mainframes, memory units or peripherals. But no buyer asks for bids on the units he wants. At most, he shops around IBM, CDC, Univac, Burroughs, etc., for complete systems, like a housewife trying different supermarkets for packaged groceries.

Nor is lack of compatibility a valid excuse. The manufacturers could make units compatible if they had to. In the bid. Of course, some big users have tried to get modifications of their own design and a mechanism has long existed in IBM, ostensibly to service these requests. However, it is designed to negate, not to satisfy, the user's desires. But the other computer manufacturers play the same game.

Second, Miss Van Horn says, "Each such spin off [computer manufacturer from IBM] should be enjoined from selling complete systems or facilities management services, and confined to selling computer components, for at least 20 years." This is getting more to the point.

However, again we have a problem with definitions. What is a computer component? Consider the operating system (basic software). Many capabilities are built into the software rather than the hardware, on the excuse that this permits greater flexibility.

For example, if I/O methods are hardwired, they would be prohibitively expensive to change, whereas in software it only requires a program modification.

This is one of the greatest examples of double-think ever foisted on an industry.

In actual effect, just the opposite is true. IBM is continually upgrading its hardware to improve performance, with no other impact on the user, but it is utterly impossible to change OS specifications. Any significant change in the I/O handling programs would invalidate every system in the world. Not a single cold-start would execute, let alone anything else.

But there is a sound business reason for putting as much I/O handling, for example, in software as possible. It utilizes more mainframe time and thus pours more revenue into the manufacturers' coffers. A few additional milliseconds don't seem like much on one job step but the multiplier is so huge as to require scientific notation to express. Every unnoticed inefficiency racks up large numbers of dollars each day in equipment rental or additional purchases.

Of course, some inefficiencies are so gross as to attract wide attention, such as sort programs. But to buy a better sort program package, the user must re-buy what he has already paid for, or thinks he has. There are other difficulties here, but they are best taken up in connection with the third topic.

Miss Van Horn styles herself "a believer in capitalism and the principle of the free marketplace." Without at all questioning her sincerity or good intentions, let me point out that both inadequate definitions and double-think confound this point of view.

IBM is the very paragon of capitalism and success in the free marketplace. They are the most successful company of this generation, by almost any standard. IBM has been to the fifties and sixties what Ford was to the teens and twenties. Possibly it is making some of the same mistakes (any color as long as it's black, any system as long as it runs under OS) but there has not appeared a GM in the computer industry to provide customer options. Even if there did, which is unlikely, would the user be better off?

A good argument can be made that there has been too much competition in the computer industry, not too little. This is not intended as a defense of IBM's monopolistic practices, which are real enough. It is not at all clear that traditional concepts of competitive capitalism are valid in trying to regulate the EDP field.

In this regard, I share Miss Van Horn's concern for the danger of the effective

nationalization of IBM. Already the computer industry is a diplomatic tool welded rather ruthlessly by the state department and export regulatory agencies.

But the real danger is that the EDP field as it is known today will come to be regarded as its necessary form. IBM management is comprised of astute business men but computing is not a business in the traditional sense. As a result of its being treated as a business, it has become an embodiment of the kind of irrelevant artificiality which our current generation is reacting so violently against.

William Orchard-Hays  
President  
Management Science Systems  
Rockville, Md.

### 'Professional Approach' Has Made IBM Number One

In response to the viewpoint written by Joan Van Horn, I disagree with the concept presented for the following reasons.

IBM was not the first computer manufacturer in the U.S. I feel the reason IBM is number one now is the professional approach used by IBM.

IBM contributed more to the computer industry through research, software releases, disk pack releases, etc., than the rest of the manufacturers combined.

In my 16 years experience in the computer field, I can honestly say that I received better hardware, better software, better engineering support from IBM than from any other manufacturer.

Part of the article mentioned the belief in capitalism and the principle of a free marketplace. I also believe in the same principles; however, I don't believe that free enterprise means that a highly successful company should be punished for its success and should be broken up.

Fred W. Stuart  
Manager, Data Processing  
Littleton, Colorado 80122

### Suggested Monopoly Cure May Be Worse Than Disease

The article by Miss Van Horn urges fragmentation of IBM as a solution to its current dominance and urges computer users to contribute to the dialogue.

Certainly a significant problem exists and equally certainly we must search for a sound solution. I am sad to say that I can propose no better solution than Miss Van Horn's, but I fear that her cure is worse than the disease. It would be un-

derstandable, in view of her litigation vs. IBM, if Miss Van Horn proposed an unnecessarily harsh remedy.

In very general terms, IBM sells approximately 10 times the volume of any one of its competitors, and it sells at prices substantially above the prices of comparable competitive products. Launching a computer series requires vast expenditure for software, plant, and the like and these costs do not significantly decrease if volume is only one tenth as much as assuming, of course, that comparable quality is achieved.

Even though IBM makes enormous profits, it is doubtful that a competitor with one-tenth the volume can make any profit at all considering its lower prices and higher per unit costs.

Of course, if IBM is fragmented into units of one-tenth its current size, the whole equation will be altered. Then all can compete on even terms and, presumably, all will be able to make a profit and survive. But what other effects will there be?

Certainly economies of scale will be lost and costs will rise and prices will follow. More sets of incompatible software will result when what we need is fewer. More interfaces between elements of a computer system will be required, work less well, and lead to that long-winded argument as to whose unit caused the system to malfunction.

More diversity will lead to fewer nearby servicemen for a particular unit and inevitably to more downtime. More makes will lead to even less upward compatibility.

I do not speak as a partisan of IBM, for IBM does not have many fans, only many customers. I do speak as a computer user, who has tried Brand X. I believe the best solution may produce a situation comparable to that existing in the automotive industry. Mergers might produce some serious competition.

Perhaps IBM can be split in two without producing too many of the disadvantages I suggested. I question the wisdom of an industry with more than three or four wide-line computer manufacturers.

David W. Chaffin  
President  
Applied Data Processing, Inc.  
N. Haven, Conn.

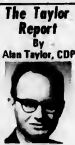
Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.



# Should You Be Satisfied With Your DP's Service?

I was recently talking to J.J. Cammarano, assistant vice-president of the Bankers Trust Credit Co. in New York, who has been in banking for many years and knows the problems and possibilities involved.

He was involved in some of the early attempts to mechanize loan department movements, moving from McBee equipment into punch cards many years ago. This particular move was not a suc-



**The Taylor Report**  
By  
Alan Taylor, CDP

cess, and after a certain length of time the systems were put back on the McBee equipment.

Now with Bankers Trust he is still involved with computers, and one of his duties is servicing the complaints the public makes about the various charges.

As is natural with a person of his amount of experience, he sees some of the problems, as well as some of the possibilities with computers. He points out that too often programmers come in with the idea of changing the way the system works.

This can be quite disconcerting for large business operations, particularly when different programmers have different ideas as to how it should work, and when many are simply not familiar with the way it actually does work.

He also understands that errors can occur when programs are changed in the computer department when the bank has to take over a series of accounts, and suddenly puts a major load on the DP area. He knows, all too well, that despite the considerable expenditures on computers, problems are still arising that are constantly requiring re-programming.

## No Question of Error

However, despite or perhaps because of all this, he sometimes tries to treat computer people as something other than the ordinary man in the street. Recently he received a letter from one computer man, Adolf Genaro Jr., who has been trying to get his accounts with the bank straightened out for nearly a

year.

There was no question that the bank had made an error. It had even acknowledged this in an undated letter that was certainly three months earlier. In August, with the matter still appearing as a debit which, with various interest charges, now amounted to \$53.30, Genaro became fed up. He had previously asked the bank to supply a statement as to just how it derived the interest charges, and had received nothing. So now he wrote to Cammarano telling him to cancel the account, pointing out and providing detailed statements to back himself up, that he owed nothing at all.

## Computer People Special?

In his response of Aug. 31, Cammarano did not supply a breakdown (the account, no point out any error in Genaro's back-up material. As he knew Genaro was a computer specialist, he thought this would not be necessary. Indeed he did not even refer to it or to Genaro's claim that nothing was due.

Instead he wrote, "Please be advised that our accounting section has recomputed the service charges on your account arriving at a balance of \$168.39.... Upon receipt of your remittance in the sum of \$53.35 your account will be reduced to a zero balance." In fact he increased the alleged debt - but gave no back-up for it.

This letter seemed particularly arrogant to Genaro and he continued to pursue the matter. (Since then Bankers Trust has provided him with an audit, and has written off the appropriate balance. On the surface, therefore, everyone is happy).

## Not Too Happy

I, however, am not too happy about the situation. One of the phrases that Cammarano used in his letter was a standard regret that his client had not been satisfied with the service. I think he was certainly telling the truth, although it might have been

more diplomatic if he had suggested that the bank was sorry that the service provided had been in error - as it had been.

But the phrase made me wonder if perhaps the problem lay in the fact that, whether or not the

client was satisfied with the service, Cammarano himself was satisfied. The problem might be that he should not have been satisfied with that computerized billing service the bank was receiving.

Probing a little bit further I discovered the real problem was that while producing control totals daily from the actual charges was comparatively simple, controlling the charges for extended payment terms was very difficult - because the same program that created them was the only one that might be considered to be controlling them. As a result more or less unchecked operations were proceeding in this area.

Therefore, when the client received a dubious charge, he might reasonably ask for documentation.

## Manual Check Systems

Unfortunately it appears that the bank does not have a computerized system capable of producing these audit trails on a particular account. As it values its reputation, it employs a staff of people who research such queries. These people, Cammarano tells me, use two basic methods.

They either go back to the bank microfilm files and manually copy all the data, and recreate the entire account by hand. Alternatively, they can go back to the daily computer printouts and track back - again by hand and very expensively - the account activity.

This technique has a number of objections. To start with, it does not reconcile the final balances with the various statements that have been received. Where service charges have been improperly taken out of payments that should instead have been used to pay for goods, this can create a balance payable on the goods, and interest will be charged on it. Re-creating a correct sequence becomes chaotic.

It would appear to me that it is a bit ridiculous to say that the way to check up on the operations of a major computer system is to use two sets of manual processing, and even then to be unable to reconcile. That sounds like very poor systems design.

Indeed it sounds to me that Cammarano, and his other people, faced with such an idea, should have reacted in the same way as with the punched card case - they should have thrown the system out. They clearly are far too satisfied with the opera-

## Standards Were Needed

Both the story of Genaro, in the adjoining column, and the operations of the South Carolina BankAmericard billing system (Taylor Report, Sept. 29) could have been avoided, if the professionals involved had followed the standards that have been published here (Taylor Report, June 21).

In the South Carolina case a new system of itemized billing has been introduced, and as a result a resident of North Carolina has suddenly found that all the descriptions of the charges made are "North Carolina transaction!" Naturally, like Genaro, he has no confidence in the correctness of the bill. And this is the problem. One of the standards was that "A bill shall be payable." This implies specifically that bills on presentation shall be in sufficient detail and capable of being checked by the customer to ensure that the amount he is being billed is the accurate amount he actually owes. In neither case was this so.

It is a pity that our systems are not more professional. They could be.

tions of their computer system! And that is the real reason why Genaro was frustrated and why millions of people now hate to deal with computers.

I do not think a time-critical billing system (such as the credit card ones) is professionally acceptable if it cannot produce, on request, a full audit of how an account was derived, plus a reconciliation with corrected data and corrected processing.

Cammarano may not be satisfied with the service he

gets - but then he is a computer user, not a computer professional. Computer professionals should know better than to use the problems with computers, and see the necessary facilities that must be built into our systems to avoid their occurrence.

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## The Professional's Viewpoint

# 'Oversold User' Should Blame Himself, Not Salesman

The next time I hear, "IBM oversold something," I think I'll scream. The fault lies with the person who signed the purchase contract.

There's an axiom in Purchasing circles about what makes the difference between a purchasing agent and a salesman—it's the 30-inch desk that separates the two. Across this desk is the dynamic give and take that characterizes our free enterprise system. "Let the buyer beware" still holds. The salesman is armed with a product (to serve a need) and the experience in negotiating with other clients. The purchasing agent should be armed with the salient facts of the company's need and a good idea of what constitutes the current market conditions.

Before a computer user complains about being oversold, he should look to himself. Did he do a lazy job of buying? Did he entrust his profit and loss responsibility

to a non-company employee? (In this case the salesman, who can't possibly assume the risk and pain of failure.) Did a vice-president of his company make a premature judgment based on haste and, maybe, greed? If so, the company deserves what it got.

On the other hand, if the user is convinced he got a raw deal, will he demand satisfaction in the most vigorous terms? This is fairly unpopular and takes determined effort; but it's a sure way of preventing future raw deals.

Recent events suggest to me, that while there is a great deal of satisfaction with "status quo," there are significant opportunities to use good purchasing acumen to gain good data processing products and supplies at the best price. However, each purchaser has to act for himself through the power of the purchase contract, rather than dealing through weak peti-

tions from users groups.

If the data processor would look closely at purchasing trade journals, he would find a great similarity in outlook between Management Information Services and Purchasing. The purchasing agent is intensely interested in gaining recognition of his efforts from top management. He is growing toward multi-disciplined approaches and has the same line-staff confusion the data processor has. He feels his is a money making function for his company and has had a hand in forcing some disciplines upon his company. He is very conscientious in learning about all possible products and vendors. He is a respected indicator of local economic trends.

Probably the most sensitive area in this thing called Underbuy, is the matter of the sole source supplier. Does the outsider really have a chance to sell the

company a different brand? This is where the purchasing agent's experience should be a great help to the data processor. The purchasing agent has been on both sides of the sole source situation for years. He should be able to identify a number of proven strategies in dealing with this.

Even if the data processor, under the purchasing agent's coaching, goes through a serious re-evaluation, the chances are still good that IBM will remain the favored supplier. With this extra effort, however, I'm convinced the user will know more about what kind of projects he is tackling—and thereby increase his chances of total success.

And with increased chances for success comes the reduction of the hazard of somebody crying foul and that he was oversold. We must work to eliminate underbuy!—Donald C. Harder, CDP, PE, Cleveland, Ohio.

### How to Participate

"The Professional's Viewpoint" page is cosponsored by the Society of Certified Data Processors and *Computerworld*.

Professionals may contribute articles, or respond to articles, by writing to: The Professional's Viewpoint, Society of Certified Data Processors, 633 Central St., Framingham, Mass. 01701.

### Curriculum Aid Offered

I have also followed with much interest the discussions on the CDP. I am very interested in lending support where I can to strengthen the usefulness of the CDP program.

I have been in education for the past six years. There are some of us in the CDP in education that would like to work on improving the CDP program and coordinating curriculum to go along with it.—Alden C. Lorents, PhD., CDP, Assistant Professor in Data Processing.

### Deadline for '72 CDP

#### Applications Is Nov. 1

Candidates for the Certificate in Data Processing (CDP) must file applications by Nov. 1 this year for the examination to be given Feb. 19, 1972.

The exam, to be given in colleges and universities in the U.S. and Canada, includes 300 questions and requires one day to complete.

Under qualification requirements adopted last April by the Certification Council, which directs the examination program, candidates for the CDP must have a minimum of 60 months of full time, or equivalent part time work experience in a computer-based information systems environment. The experience need not be consecutive.

The exam consists of five sections, all of which the applicant must pass to attain the CDP: data processing equipment, computer programming and software, principles of management, quantitative methods, and systems analysis and design.

The fee is \$50. Application forms and a study guide are available free from DPMA, P.O. Box 195, Park Ridge, Ill.

#### Practice Questions for the CDP EXAM

Don't be one of those who will walk away from the CDP exam saying, "If I had only known." Many fail the exam because they don't know what to expect. They clear their heads and don't even have a chance. Many think that if they have plenty of experience they can pass the exam and make a profit—can—if they prepare properly and read their copy.

These practice questions for the CDP exam can provide the last lasting experience that you need—300 questions cover all 5 sections, give hints in how to prepare and how to take the exam. Order now and get the reproduction price of \$6.95, check or money order. Florida residents add \$2.25. For more information, contact: 2527 B. Joel Road, Pompano Beach, FL 33061.

# THE BELL SYSTEM HAS 13,000,000 MILES OF DIGITAL COMMUNICATIONS CHANNELS, AND IS ADDING TO THEM AT THE RATE OF 8,000 MILES EVERY DAY.

If this is good news to you in the data field, good news for personal computers. Our purpose is better service to our customers and their computers.

Our new digital communications network, called DCS, is the first of its kind. It's a new way of thinking about communications. It's a new way of thinking about the way we do business. It's a new way of thinking about the way we do things. It's a new way of thinking about the way we do business. It's a new way of thinking about the way we do things.

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Machine-Readable  
Record Retention  
Basic Accounts Payable  
Card Record

Retention Period  
(Beginning 1/1/71)  
Until expiration of  
Statute of Limitations

Other Provisions  
Agreed Upon  
Taxpayer plans to transfer  
card data to disks periodically  
and retain disks for IRS pur-  
pose. IRS to apply its own  
retrieval program where ap-  
plicable or one prepared by tax-  
payer using taxpayer's com-  
puter at a time mutually agree-  
able.  
Same

Current Month Card Input to Same  
final distribution and general ledger

The provisions agreed upon are:

- 1) Retention of the Sorted Accounts Payable Monthly Distribution File. The retention of this file should commence with the fiscal year beginning September 1, 1971, and be retained until expiration of the Statute of Limitations.
- 2) The Internal Revenue Service will apply its own retrieval program using your data processing facilities at a time mutually agreeable.

If you agree that the above-mentioned items conform to our arrangements, please sign the concurrent copy of this letter and return it in the enclosed envelope.

If you make any changes in your ADP accounting system or record formats that will affect your ability to comply with these provisions, please notify us.

We will let you know if our future audit needs require changes in your record retention practices.

The two IRS Computer User negotiated agreements shown above (after identifying material has been struck out) illustrate the way that these are currently being formulated. Note the inclusion of details regarding provision of programs, and the use of computer time, as well as definition of machine records involved.

## IRS Says Data, Not Tapes, Protected By New Ruling

On the Professional Viewpoint page of August 25th, the questions of just what the new IRS Ruling 71-20 meant to computer users was raised. The ruling itself indicated that "Punched cards, magnetic tapes, disks and other machine-readable data media used in the automatic data processing of accounting transactions constitute records within the meaning of Sections 1-6001-1 of the IRS Regulations and are required to be retained so long as the contents may become material in the administration of any internal revenue law."

The main problem involved in the August 25th discussion was based on the requirement to retain the physical tapes, and the various attendant difficulties. The IRS viewpoint, as expressed during the meeting, however, is that it is the data on the tapes — and not the tapes, or disks,

etc. — that they want retained.

It appears that while it is known that discussions were held with the accounting and tax consultants' professional bodies about the wording of the regulation before the ruling was issued, no equivalent

As a result of the publication on The Professional's Viewpoint page of an article questioning the impact of IRS Ruling 71-20, the Internal Revenue Service invited a representative of the Society of Certified Data Processors to discuss the interpretation of the ruling. This article is derived from material gathered in the resulting interview.

discussions with professional data processing societies were held, and the technical distinction between the information held on the tapes, and the tapes themselves had not been noticed.

While this clarification of their intent, when formally issued by IRS, does away with most of the previous fears about the impact of the rule, it was also found that there were further implications over and above the pure retention requirements that flow from the new ruling.

In particular it appears that now computer installations have the duty of maintaining flow-charts and details of at least major system changes so far as they might affect any of the accounting records, as well as maintaining the actual data itself. This duty comes from the previous descriptions of how the IRS wanted anyone to be able to determine correct tax liability where a taxpayer maintained part or all of his accounting records on computers, and was published in 1964 as Revenue Procedure 64-12.

It states that "The statements and illustrations as to the scope of the operations should be sufficiently detailed to indicate (a) the application being performed (b) the procedures employed in each application (which, for example, might be supported by flow charts, block diagrams or other satisfactory descriptions of input and output procedures) and (c) the controls used to insure accurate and reliable processing. Important changes, together with their effective dates, should be noted in order to preserve an accurate chronological record." When this is taken into consideration it can be seen that the impact of 71-20 goes beyond the tape retention problem previously discussed.

### IRS Minimizing Costs

It is clear that the IRS is moving to minimize the additional costs involved. A specific exclusion in the ruling provides for punched cards to be dumped after card duplicates are available on tape.

However, the main method open to taxpayers to minimize the costs involved is to negotiate an agreement with the IRS which will lay down the details of just what is required. The major parts of two such negotiated agreements are shown in the above box.

### Hard Copy Not Now Enough

One other method, that of maintaining hard copy records, is apparently insufficient. While in some cases machine-readable records can be substituted for hard-copy, the opposite no longer holds true once the accounting system concerned has been automated.

### User Action Recommended

As a result, the first action any installation should take if it has any accounting record processing is to contact the corporation's tax accountant, and then, working with him, apply to the IRS for a meeting to come to an agreement. Until you have negotiated an individual agreement with them, the safe rule appears to be retain all records, but do so economically, by consolidating them onto tapes.

computer, punched cards, digital tape, magnetic tape, and other machine-readable data processing media, or other, as follows:

Digital data processing is better than any other method of processing various kinds of records, thereby getting more information from the same space available with greater accuracy.

Digital is clearly technology's best answer for most of America's future communications needs. It will be efficient, fast, and not just our data customers.

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- By mid-1973, a new digital system that will increase data transmission rates per second 30 times over the speed of our present digital lines.
- By mid-1975, a new digital system that will increase data transmission rates per second 30 times over the speed of our present digital lines.
- By mid-1976, a new digital system that will increase data transmission rates per second 30 times over the speed of our present digital lines.
- By mid-1977, a new digital system that will increase data transmission rates per second 30 times over the speed of our present digital lines.

The American Telephone and Telegraph Company is currently working on a new digital system that will increase data transmission rates per second 30 times over the speed of our present digital lines.

The American Telephone and Telegraph Company is currently working on a new digital system that will increase data transmission rates per second 30 times over the speed of our present digital lines.



## OS USERS LATE REPORTS??? DP COSTS TOO HIGH???

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North American Rockwell  
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## Open FJCC Sessions to Explore Impact, Social Solutions, Community Utilities

LAS VEGAS — A new approach to the "computers and society" issue will be taken during two special open sessions at the Fall Joint Computer Conference Nov. 16-18 here.

Instead of focusing on social problems generated by computers, one discussion will center on the "rapidly growing need" for computers to "help ameliorate significant social problems," said Dr. Harold Sackman, organizer of the special sessions.

The other meeting is intended to work toward a plan for "community information utilities," Sackman stated. Such a plan would "lead to economically feasible and humanistically designed prototypes," he added.

The "Problems of Society" session will feature a panel discussion, with members addressing themselves first to leading social problems in a given area, then to the questions of how computers can help people to understand and solve these problems, Sackman noted.

If the panel is successful in the second portion of its stated function, the session will represent a

departure from the usual "social implications" or "social problems" sessions of other conferences, which normally stop with problem definition and discover little in the way of solutions.

Sackman is chairman of the Social Implications Committee of the American Federation of Information Processing Societies (AFIPS), sponsors of the semiannual joint computer conferences.

Topics and discussions are:

### Societies/User Groups

- International Cooperation: John McLeod, World Simulation project of Simulation Councils, Inc.

- Computers and the Deterrence of War: Dr. Edwin W. Parsons, The Rand Corporation

- Urban Problems: Prof. Peter Kamnitzer, UCLA

- Ecological Problems: Prof. Roger Weinberg, Kansas State University

- Educational Problems: Dr. Norton F. Kristy, Refocus

Both meetings are open to the public, and therefore to exhibit-only registrants at the conference. They will be held Tuesday afternoon (Nov. 16) in the Theater Royale of the International Hotel.

The meeting on "Planning Community Information Utilities" will bring together an interdisciplinary panel to review the results of a special conference sponsored earlier this year by AFIPS.

Participants have been working in three basic areas which correspond to the principle components of a prototype community information utility: information services, system design, and management.

Sackman will deliver an introduction to the session, and co-chairman Dr. Barry Boehm of The Rand Corporation will summarize conference results.

Topics and discussions are:

- Information Systems: Dr. Edwin B. Parker, Stanford University.

- System Software: N.D. Cohen, The Rand Corporation.

- Economic Design: Prof. Norman R. Nielson, Stanford University.

- Management Prospects and Problems: Dr. Burt Nanus, University of Southern California.

## Calendar

Nov. 3-6, Dallas — 1971 Annual Meeting of the Graphic Communication Computer Association of Printing Industries of America, Inc. Contact: Norman W. Scharp, Executive Director, GCCA/PIA, 1730 North Lynn St., Arlington, Va. 22209.

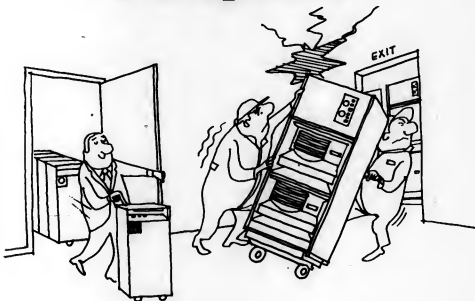
Nov. 7-11, Denver, Colo. — 34th Annual Meeting of the American Society for Information Science. Contact: Miss Sheryl Wormley, ASIS, 1140 Connecticut Ave., N.W., Suite 804, Washington, D.C. 20036.

Nov. 10, St. Louis, Mo. — National Conference on the Use of On-Line Computers in Psychology, sponsored by the National Science Foundation and St. Louis University. Contact: Dr. Donald I. Tepas, Dept. of Psychology, St. Louis University, St. Louis, Mo. 63103.

Nov. 10-12, San Francisco — 19th Annual Public Utility Information Systems Conference sponsored by the American Gas Association, Inc. and the Edison Electric Institute. Contact: Mr. A.L. Peterson, Edison Electric Institute, 90 Park Ave., New York, N.Y. 10016.

Nov. 22-23, Providence, R.I. — Conference on Statistical Methods for the Evaluation of Computer Systems Performance. Contact: Professor Walter Freiberg, Chairman, Division of Applied Mathematics, Brown University, Providence, R.I. 02912.

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THE WORD IS OUT! It now takes two IBM 2314's to deliver the storage capacity of one MARSHALL M2900 Dual Density Direct-Access System. 466 million bytes. One complete M2900 System costs \$5,000 per month as compared to two IBM 2314's costing \$10,128 (or \$5,064 each) per month based on a 1 year lease. What about compatibility? The M2900 Disc System has OS/DOS compatibility with IBM System/360 (model 25 and above) and IBM 370 (all models). Now, doesn't it make sense to indeed move up to Marshall Data Systems and join with us in helping you save your company \$60,456 per year?

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Pittsburgh (412) 922-7800 / Detroit (313) 355-1570  
Washington, D.C. (703) 532-2661

**marshall data systems**  
A Division of Marshall Industries



October 27, 1971

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## Random Notes

## On-Site Systems Support Offered by 'Tasc' Force

**PALO ALTO, Calif.**— Tymshare Inc. has organized the Tymshare Applications and Systems Consultants (Tasc) force to provide on-site support for the network's subscribers. The new group is available to help everything from initial problem definition through final implementation of an applications system.

The Tasc Force is headquartered at 189 Van Rensselaer St., Buffalo, N.Y., N.Y., 14210.

## Print/Punch 'Asap' Spooler Available from Universal

**BROOKFIELD, Conn.**— An output writer version of the Asap I/O DOS spooling package from Universal Software Inc. operates in 3K and spools any number of printers and punches, both real and imaginary, the firm said. Immediate printing and punching, forms change, automatic forms alignment and priority interrupt features are included in the \$2,900 writer version.

Both the simple output spooler and the full Asap, which spools card readers as well, are available from Universal at Station Road, 06804.

**'Dynachart,'** Cobol Diagrammer, Adapted to Wide Range of CPUs  
**MOORESTOWN, N.J.**— Versions of Dynachart, a flowcharting system for Cobol users, are available for use on 83500 and 85500 CPUs, Honeywell 200 and GE 600 series, and CDC 3600, according to the developer, Applications Programming Co.

The \$4,400 package had originally been implemented on IBM 360 and RCA Spectra 70 processors. It requires either 24K or 32K, and disk capability in its 360 implementation.

APC is at 364 Pleasant Valley Ave., 06057.

**ASK Adds Remote DDA Package**  
**CHERRY HILL, N.J.**— A demand directed accounting system featuring remote reserve capability and remote computer-to-computer collection of items is available from Arthur S. Kranzley & Co. Inc. (ASK), for use on disk-oriented 360/40s with 256K.

The system handles transactions from satellite CPUs, usually 16K, 360/20s, located where regional concentrations of activity occur, either at the branch or correspondent bank level.

ASK, 1010 S. Kings Highway, 08034, installs and provides 6 months support for the system for "about \$500/month."

## Softech Circuit Analysis Bows

**WALTHAM, Mass.**— Engineers with 256K partition available to them under OS/360 can analyze 100-node circuits with the AED Circuit Analysis Program (Aedcap) package from Softech Inc., 391 Totten Pond Road, 02154.

Aedcap includes editing facilities, built-in circuit models, library files, functions and graphic output capabilities which permit both static and dynamic manipulation of measured circuit behavior. The package carries an installation charge of \$15,000 plus a \$600/mo lease fee.

Aedcap is also available through the National CSS time-shared network, based in Stamford, Conn.

## Vendor Cities Pros, Cons

## On-Line Programming Problems Defined

By Don Lesvitt  
Of the CW Staff  
**NEWTON, Mass.**— There are very real advantages to using the on-line program development systems which have become available on an increasing number of time-sharing networks in the past 12 to 18 months. But there are also some drawbacks and prospective users should be aware of these, according to a spokesman for one of the nets.

Speaking at the DPMA Division 14 fall conference held recently, John Thompson, vice-president of Interactive Data Corp., noted that the programming systems, which can include everything from pre-compilers to symbolic debugging aids, are often "too demanding" for the user who is still batch-oriented in his thinking.

Users with bias are accustomed to studying complete program listings and error messages, at their own pace, at the end of an assembly or compilation. The on-line systems, by contrast, demand resolution of an error as it is encountered. Interactive program development can be fast and it can be fun, if the user has the right attitude, but Thompson added that studies indicate users often do not get the same sense of satisfaction they get with batch processing.

Programmers often stay on the terminal too long to be effective.

The new systems allow the same degree of flexibility as console debugging did on second generation CPUs. But if users stay on more than about 90 minutes at a time, they tend to end up with a patched-up "kludge," Thompson said.

Programmers also tend to move to the machine too quickly. They skip desk checking of source code and let the pre-compiler spot errors for them. This may be fast, Thompson admitted, but it is an expensive way to avoid some clerical effort.

Programs developed on a time-shared system often stay on the network after development, even if originally intended for use on the user's in-house installation. Balancing all the drawbacks, Thompson noted that on-line systems tend to be

impervious to changes in specifications, which are the bane of batch-oriented assembly systems. The time-shared systems allow the user to access "his" computer as soon as he is ready. He doesn't have to wait until assembly and test time can be scheduled. In Thompson's view, the complete on-line development system should include a pre-compiler which can accept standard or user-defined abbreviations, and a compiler that is compatible with the user's in-house equipment.

A test data generator and symbolic debugging capabilities, as well as the ability to test individual program modules should also be part of the system. Finally, for Cobol users there should be an ANS language conversion program, a sort and a JCL scan routine, he added.

## Data Retrieved in Batch or TP With 'Report Creation System'

**RENTON, Wash.**— Data retrieval in batch or teleprocessing mode, and the generation of up to 10 separate output files are among the capabilities of the Report Creation System (RCS), according to the developer, ACT Management Systems Inc.

RCS allows free format statements and

has relatively few grammatical rules, the firm said. Access to and from files is handled transparently but output may be directed to printer, card punch, tape, disk or drum on any IBM 360 or RCA Spectra 70.

Special file-defining tables are designed to eliminate the need for detailed specifications of data sizes and descriptions within each program. The system offers unlimited levels of selection and accommodates decimal arithmetic, data editing and conversion, ACT added.

The reports can have very simple formats, controlled by default options, or they may be as complex as the user requires. Page and column headings can be user-defined.

RCS is written in Assembler Language and functions under any of the IBM 360 or RCA Spectra 70 operating systems. It requires 56K under DOS and 75K under OS.

The system may be leased for \$280/mo, or purchased for \$8,000, from ACT at 15 Grady Way, 98055.

## Payables Package Has 20 Reports

**ENCINO, Calif.**— Cobol-based users can handle multiple clients with the CAS Accounts Payable System (Casaps) available now from Computer Applied Systems Inc. (CAS).

Interactive package processing time to a minimum by performing all operations in one pass of the master file, which includes both vendor and job information, CAS said. The system also prints voucher checks two-up.

Casaps provides automatic repeat payments, general ledger account totals, variable heading and trailing messages on

voucher stubs, and automatic "prompt payment" discounts.

More than 20 separate reports are available through modules that can be integrated with the basic system.

Four Cobol programs and two sorts comprise the entire Casaps package which can be modified to interface with the user's check reconciliation system. Any CPU with a Cobol compiler can utilize Casaps.

Casaps costs \$15,000 under license and can be ordered from CAS at 18075 Ventura Blvd., 91316.

## Redcor Strengthens Keylogics By Adding 'System 8' Software

**WOODLAND HILLS, Calif.**— Redcor Corp.'s new System 8, a software package for its Keylogic, key-to-disk data entry system, includes automatic left or right justification of any field with optional blank or zero fill.

Mod 9 check digit logic has been added to the Mod 7 and 11 logic available previously, and check digit generation as well as validation is part of the system.

Batch total counters are 13 digits long. A new command allows a supervisor to obtain a listing of those batches that meet user-specified criteria, such as in- or out-of-balance or error free, Redcor said.

The supervisor is also able to obtain batch subtotals based on changes in key fields within each record. Fields used to define the subtotals are selected by the supervisor. This feature is intended to permit quick correction of batches that are out of balance.

Redcor Corp. is at 21200 Victory Blvd., 91364.

## Leasco Offers Corporate Data

**WASHINGTON, D.C.**— Financial information for 1,000 industrial companies dating 1970 is available in a software package free to subscribers of Leasco Response Inc.'s Leasco 360 time-sharing system.

The corporate data base on the leading industrial firms is called Corpdata and can be used by financial analysts as a preliminary screening tool to identify performance and financial data defined by several criteria. Corpdata for the top 1,000 companies in 1969 is also available for comparative purposes, Leasco noted from 3401 Westland Ave.

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## Grocers Get Help

NASHUA, N.H. — The Wholesale Grocery Billing and Inventory Control System, developed by Dataroyal Inc., provides daily information relating to any item of merchandise handled by a food distributor.

Written to run on an IBM 360, the system generates, daily stock status, unit pricing, item movement, picking list and other user-determined reports.

Cash application lists, detailed statements and aged trial balance are available, as are reports of aged overdue accounts and sales summaries for control of delinquent customers. Sales, promotional and profitability analysis are also included, the company said.

The package is programmed in RPG and operates on systems as small as a 32K 360/20. The software is priced at \$15,000 and is available in disk- or tape-oriented versions from the firm at 235 Main Dunstable Road, 03060.

## Based on T/S PDP-8s

# Airlines Can Share Passenger System

LONDON — Airlines with relatively few flights can share the capabilities of the DEC PDP-8 based Load Optimization and Passenger Acceptance Control (Lopac) system, developed jointly by and available from Cable and Wireless Ltd. and Scientific Control Systems Ltd. (Scicon). Lopac can be time-shared by several users having a total of at least 8,000 flights or 250,000 passengers a year. Otherwise, a single user with 5,000 flights each year would find Lopac economically feasible, the developers said.

### Handles Jumbos

Lopac handles up to 100 simultaneous flights and has been designed to cope with the largest jets, or any smaller aircraft. It is said to include either automatic or manual flight initialization and preallocation of passenger seats. It also calculates factors that affect weight and balance, and warns if resulting values fall

outside safe limits.

The system utilizes Bunker-Ramo Model 2212 Display Stations, developed specially for passenger check-in and load control functions. These tie into dual DEC PDP-8s, each of which has 16K core, and two disk files. Duplication of the central processor ensures continuity of service in the event of a hardware failure in the primary unit, company spokesmen explained.

### Files Are Secure

Each user's files are available only to his own terminal locations. The data files and allocation of terminals to the airlines may be amended while Lopac is operational, a spokesman noted.

Lopac can generate all lists and information required for each flight. These include passenger reservations, seat allocations, manifests, load sheets and load mes-

sages, and no-show lists. Statistics are shifted to a history file and cleared from the active file as each flight departs.

The price for Lopac varies from \$600,000 to more than \$1 million, including all hardware and software.

Cable and Wireless Ltd. is at Mercury House on Theobalds Road, and Scicon is in Sanderson House on Berners St., both here in London.

## New Entries Trigger Fresh Library List

LOS ANGELES — Large organizations maintaining large libraries of technical manuals, journals, books, drawings or records can have current listings of all their documents, by key word or general classification, with the Library Retrieval System (LRS) available now from J. Toellner & Associates.

LRS works, according to Toellner, partly because it imposes on the user a simple but effective clerical method of filing the documents as they are received. The document library may be divided into a number of sections, but documents are stored within each section by serial number only.

Section, serial number and as much of the title or text of the document as the user wishes to catalog are entered on punch cards. The user may include a general class code, as well as identifying key words within the title or text. A separate record is created for each key word, identified in the LRS by an asterisk in the card column preceding the word.

Reference lists, sequenced by keyword or class, are printed by the system whenever new records are added. Thus a user can always know the current status of his library, Toellner said.

LRS is written in Fortran IV (F level) and will run in 32K on an IBM 360 under DOS. Three tape drives and one disk are required. The system also utilizes standard IBM sorts and utility print programs. It costs \$500 and can be ordered from Toellner at 1930 Wilshire Blvd., 90057.

## Parameters Prescribe Payables Processing

MARINA DEL REY, Calif. — Control parameters determine report selection, reporting detail and processing requirements separately for each client being processed under an accounts payable program from Ancom Systems. Users also have the execution-time option of manually overriding the intended processing, to meet special situations.

The system calculates discount amounts, determines discount dates and final due dates, and pro-rates taxes and freight charges to accounting line items. It also generates contra payments and balances accounting distribution.

### Separate Controls

More than 2,500 companies, or corporate subdivisions, can be processed in one pass of the system, with each company having its own organization coding, separate accounting controls and reporting.

The package maintains IRS 1099 accounting records and provides automatic interface to general ledger, inventory and check reconciliation systems. The user can determine his own payment cycle, and payment cycle transactions are accumulated to produce monthly reports.

The Ancom system uses 32K of core and three files, one of which must be disk, and is currently operational on IBM 360 and Honeywell 200 series CPUs. Ancom Systems is at 8929 S. Sepulveda Blvd., 90045.

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October 27, 1971

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## Bits and Pieces

Univac Adds OCR-B Font  
On 9200 and 9300 Series

PHILADELPHIA, Pa. — Univac has added an OCR-B font to its 0788 series printers. The font consists of 14 numeric and special characters for use with 9200 and 9300 CPUs. The 2703 Optical Document Reader can use the new font when equipped with a special selection feature.

The new font is designed for handling "turnaround" documents such as utility, tax, and mortgage bills which are returned for optical scanning, Univac said. The font will be available free to Univac users as of January.

Meritag Point-of-Sale System  
Uses Honeywell 316 Mini

FRAMINGHAM, Mass. — Dannon has introduced the Meritag point-of-sale system. Based on the merchandise ticket that has data encoded on circular magnetic tracks, the system is an outgrowth of the Trader system previously used by J.C. Penney.

The Meritag unit operates off-line and tickets are batch processed, while the Trader system operated on-line. Ticket information is transferred by a Meritag reader directly onto computer-compatible tape.

The new system is based on a Honeywell 316 CPU. Prices are set according to ticket throughput, but a typical system handling 300,000 tickets/mo would cost about .009 cent/transaction, a Dannon source said.

## Certified Cassette Costs \$8.50

MOUNTAIN VIEW, Calif. — A certified data cassette that complies with Ansi and Ecma standards has been introduced by Information Terminals Corp. Each T300 cassette is certified after final assembly to assure zero dropouts.

An off-center hole is provided in the back edge of the T300 cassette for use in drives designed to Ansi specifications. Hinged write-lookout tabs are permanently attached to the case, but can be moved to permit re-recording of data. The T300 is available for \$8.50 from 1170 Terra Belle Ave., 94040.

## Caelus Has S/3 Disk Cartridge

SAN JOSE, Calif. — Caelus Memories Inc. has announced a disk cartridge for System/3 called the CM III. It can also be used with Caelus CD300 series disk file systems.

Price of the CM III is \$150. First deliveries are scheduled for November from 967 Mabury Road, 95133.

## Costs \$2,200

## Printec-100 Prints at 100 Char./Sec

By Michael Merritt

WOBURN, Mass. — A \$2,200, 100 char./sec impact printer designed as a low cost output peripheral for minicomputers has been introduced by Printer Technology Inc.

The Printec-100 uses a print wheel and hammer arrangement similar to the mac-

hanism used by Univac and Synerdata on their 30 char/sec printers. The Printec mechanism, though, uses six hammers to imprint characters from three separate fonts on the print wheel.

The unit prints the standard 64 char. Ascii set on a 136 char. line. It also has an integral vertical format unit for tabulation work. The unit uses an ink wheel

good for 30 million impressions, the company said, rather than a ribbon.

Options include buffers, modems, different type fonts, and colored ink wheels. An Ascii interface is standard, but others are available including an OCR font and a 94 char. Japanese font.

Printer Technology said the serial printer can produce up to six simultaneous copies. A company official noted that while teletypewriters are "undoubtedly the least costly computer output printers available," the Printec-100, which prints at 10 times the TTY's rate, "affords a five-fold throughput-per-dollar performance advantage."

The unit costs \$2,200, and delivery is in 60 days. Printer Technology is at Sixth Road, Woburn Industrial Park, 01801.

Milgo Offers Plotter  
System With Nova CPU

MIAMI — Milgo Electronic Corp. has combined a Nova mini with its digital plotter to provide users with a programmable plotting system.

The DPS-8 allows the user to select up to 20 files stored on magnetic tape and command the plotter to draw the plots automatically. The program-controlled input format permits the use of previously programmed data, eliminating the need for special conversion software, Milgo said.

Before the plotter begins, the Nova inspects the data and optimizes the plotting speed so that drawing quality is maintained.

When combined with other terminal and communications equipment, the Milgo system can be used as a remote off-line, remote job entry, real-time plotting, or interactive graphic system. The system can also be expanded to act as a stand-alone central processor.

The DPS-8 is offered with either a 30 in. by 30 in. plotter, or a 45 in. by 60 in. plotter. The smaller system costs \$66,000, and both versions will be available early next year. The firm is at 7620 N.W. 36th Ave., 33147.



DPS-8 Plotter

'Smart' Add-On Core Memories  
Faster, Cheaper Than 360 UnitsBy Ronald A. Frank  
of the CW staff

SANTA ANA, Calif. — Standard Memories Inc. has introduced a series of plug-to-plug expansion memories for IBM 360 models 30, 40, and 50 called the Smart system. The add-on core units, the SM-300, -400, and -500 are said to offer users savings from 15% to 25% over comparable IBM memories.

The Smart add-on units are available in modular 8K increments for total add-on capacities of 128K for the 30, 512K for the 40 and 1 Mbyte for the 50. The memories operate at 750 nsec, twice as fast as the 30 memory which runs at 1.5 µsec, a company spokesman said.

The memory units have already been

field tested with "over 1,000 hours" of operations. The Smart systems can be maintained independent from the CPU through a special test panel on each unit.

A typical 128K add-on system for a 360/40 with 256K of core would cost \$2,750/mo compared with \$3,800/mo for an IBM memory. Purchase would be \$136,000 for the SM-400 compared with \$175,125 for the IBM unit, according to a Standard spokesman. The Smart systems are available on a three-year lease basis but prices do not include maintenance.

The memories are immediately available with service support provided by Comma Corp. Standard Memories is at 2401 S. Broadway, 92707.

## Fiche System Has Developer

CUPERTINO, Calif. — A microfiche recording system with an automatic internal film processor has been introduced by Quantor Corp. Called the Quantor 105, the system is compatible with IBM OS and DOS 360/370 CPUs.

The system delivers cut, dried microfiche at a rate of one fiche (208 pages at 42X reduction) each minute or the equivalent of 12,000 CPU printout pages/hour.

The Quantor 105 includes two IBM compatible software packages: Automatic Microfiche Editor (AME) and Formatting Automatic Microfiche Editor (FAME). The software can be written in Cobol or other "generally used" languages, and desired portions of the data base can be indexed and titled for off-line microfiche recording.

The recorder is said to operate automatically thereby freeing the operator to duplicate and distribute fiche copies during a recorder run. To begin a 105 system operation, the operator loads a computer output tape on a tape drive and inserts a "job card" to start the run.

The job card is credit-card sized, containing punched information in 12 of its 22 columns. It can be manually formatted on a Whirlwind punch device, or it can be prepared by Quantor for the user, a spokesman said.

The card controls such variables as 24X or 42X reduction; form side mode; read on parity error conditions; and it determines the type of tape format (COM or IBM) that will be accepted for input during the run.

Conventional film processors and labs are not required because of the built-in developing capability. Films loaded in Chem Packs, closed containers, are loaded into the 105 by Quantor representatives after 600 fiche or three cartridges have been processed.

Typical cost of producing a microfiche is 0.2 cents/page. Duplicates cost about 0.03 cents, and originals are developed on silver halide films with the 105 system. The microfiche system costs \$59,950 or \$1,750/mo with service and maintenance. Quantor is at 10950 N. Tantau Ave., 95104.

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**GIS INFORMATION SYSTEMS**

## Planned for 1974

# AT&T Plans 'Data Under Voice'

By Ronald A. Frank  
or the CW staff

NEW YORK — AT&T plans to increase its data facilities by utilizing portions of existing voice microwave links. But the new service will not be available until 1974, Bell said.

The new transmission method developed at Bell Labs makes use of baseband frequencies in the existing microwave systems to add a 1.544 Mbit data stream capacity without reducing existing voice channel traffic, according to an AT&T spokesman.

The key to the new capability, called Data Under Voice (DUV), will be the addition of new terminal equipment to existing microwave links, AT&T Chairman H.J. Romnes told a meeting of financial analysts.

The development will enable Bell to meet the demand for digital data services "through 1977 largely through the use of existing facilities," the AT&T spokesman said. Radio relay systems capable of carrying DUV signals currently comprise 67% of AT&T's long lines network, Romnes noted.

Field trials of the DUV transmission methods will be made "in early 1972."

AT&T had previously announced its digital data system would be in operation by the mid '70s. Earlier this month AT&T Vice-President Samuel Boness described this network as being "functionally discrete

## Communications

but physically integrated," with the existing Bell System.

The new DUV facilities were described "as a byproduct of the Bell System's analog capability," by AT&T. The system will utilize baseband frequencies of existing U600 and L600 carrier systems. On the more modern U600 systems, a 1.544 Mbit data stream can be added to existing 1,200-voice channels, without decreasing the voice

capacity. On the L600 system the same bit stream would eliminate about 120 voice channels. Although it is known that the DUV terminal equipment will be installed at existing microwave sites, few technical details were announced. An AT&T source said the equipment has been developed at Bell Labs and should be ready for field testing soon. The first FCC filings to cover installation of DUV equipment will be made in "six to eight months," AT&T said.

The DUV type offerings could be switched and all-digital, according to one industry expert. In May, 1970, AT&T issued preliminary specifications for a new 306 data set which can operate with a switched offering. The 1.344 Mbit data rate of the 306 would make it compatible with the DUV services, the source said.

## MCI Gets FCC Approval For N.Y.—D.C. Route

WASHINGTON, D.C. — The FCC has approved the application of a specialized common carrier to provide service to users between New York and Washington, D.C.

The microwave link filed by Interdata Communications Inc. is part of the MCI network and consists of 11 sites along the populous northeast corridor.

The commission approval was the first to be granted since the 18920 ruling earlier this year paved the way for specialized carriers to begin competing with existing carriers such as AT&T. The MCI link between Chicago and St. Louis, which was not covered in the 18920 proceedings, has also been approved by the FCC and is about to begin

service.

The interdata link construction should take about nine months, and service to users could begin late next year after a system test and evaluation phase has been completed, an MCI source said.

The interdata filing was the first link proposed to the commission after MCI presented its precedent-making midwest route to the commission in 1963.

If the commission continues to consider the specialized carrier applications in order, the next route to be approved could be the MCI New York West filing between Chicago and New York. This would allow MCI to build facilities and provide service to users from Washington west through Chicago to St. Louis.

## Omnitac Has TTY Modem

PHOENIX, Ariz. — Omnitac Corp., a firm known for acoustic couplers, has introduced a teletypewriter modem. The automatic answer device, designated the Model 4001, converts Model 33, 35, and most other TTYs into on-line communications stations for either attended or unattended operation.

In the unattended mode, the 4001 detects a ring signal; turns

the TTY on; performs the handshake routine; receives data and turns the unit back to stand-by, all automatically.

The 4001 is compatible with Bell 103A data sets or equivalent modems and will operate with CR8 and CR7 DAA units Omnitac said. First deliveries are scheduled for January and the unit is priced at \$435. The firm is at 903 N. Second St., 85004.

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### Review and Analysis

## OEM Business Coming Out of Recession

The OEM side of the computer business has undergone a severe shock during the past two years as the recession held back traditional markets and new ones failed to materialize as fast as expected.

The recessionary period led to a shake-out among many firms in the business and forced many others to change direction and move into the end-user marketplace to generate new profits and revenues.

This shakeout in turn left many former OEM customers bewildered: How could they know which companies would remain viable suppliers and which would fail? If there was a large possibility of failure, shouldn't they begin producing all their equipment in-house and forget about the OEM?

At the same time, the recessionary period held down the use of new technologies to a large extent. Just two years ago the debate between semiconductor memory advocates and the entrenched core backers began. It is still going on, but it perhaps more fierce today than before as more semiconductor firms compete for memory contracts.

The most significant trends in the past year have been the move into the end-user market and the lack of company credibility that has arisen from the many failures in the business.

Also it is clear that technology has taken a back seat to the efforts of generating profits and staying in business during the rough times that have just passed.

#### End-User Business

As soon as sales started dropping for the OEMs in their traditional roles, they immediately looked to the end-user marketplace for rescue from sagging revenues and mounting losses.

But they found, as Trude Taylor of EMM said, the end-user business is a "whole new ballgame." The traditional OEM did not know how to compete in this new area, he did not know the needs of the end-user.

This lack of knowledge - and the traditional computer users' reluctance to new products from untested and unknown firms - led to as many failures as successes and caused the user to be even more wary of the new entrants.

Those firms that made the transition, however, found the end-user market would easily help even out their sales curves so that profits would not be subjected to the wide variations caused by the unstable OEM side of the house.

They also found the only way to success was a strong overall commitment and beefed up marketing and service staffs. In addition, they had to begin serving the customer and offering systems that met the needs of the real world and not the laboratory.

How one company, Electronic Memories & Magnetics, began to try to penetrate the mysterious end-user market and the steps it has taken, is one of the subjects covered in this supplement.

The problem of how to evaluate an

OEM supplier has occupied the minds of most purchasers - and is also covered. The problem used to be one of finding equipment that met the necessary specifications, but this has changed. Now the potential supplier's balance sheet and reputation play a role as important, if not more important, than do the specifications of the equipment offered.

No longer can the OEM supplier expect to be judged solely on the performance of his equipment; he must be able to prove to the potential buyer he is capable of remaining in the business for several years.

He must also show he is capable of supplying a great deal of maintenance and service that was not necessarily expected in the past.

These new evaluation criteria are coupled with increased competition in the OEM side of the business to keep the number of companies at a minimum. New companies are finding it harder than ever to compete with the entrenched firms in their market areas, even if they try to cut prices or offer superior technological machines.

#### Minis Hit Hard

While most of the OEM business has run into rough sledding in the past few years, the minicomputer segment has been hit particularly hard - both from without and within.

Many former customers began turning to in-house development instead of buying on the OEM market, and at the same time extreme price cutting came from within the industry itself.

The idea of making a system that would be all things to all people began to die out as some firms began offering mini-computers that were as much components as they were computers. Others began pushing the concept of "functional" systems which were more modular in approach with different modules capable of performing specific tasks.

#### Unexpected Help

While most segments of the business were affected by the rough economy,

several received boosts from unexpected areas. The tape drive industry, for example, received a boost from the growing cassette and cartridge markets and both the tape and disk businesses received help from the unexpected boom in key-to-disk systems.

The troubles of the past years now seem to be largely behind the industry - most company officials now feel that "the worst is over" and that the sales curve can only go up from now on.

But at the same time, the experience has matured the industry, many now realize that the customer's needs - whether the customer is the immediate purchaser or ultimate user - must take the forefront in product planning over technological gadgetry.

They know that customers can no longer be left "with a piece of hardware and a handshake," that service and reliability are the keys to success in the new OEM business that has developed.

The new, still emerging business differs from the old almost as much as the end-user business. It will not be penetrated easily by many firms who retain the old philosophies and marketing strategies.

#### Shakeouts

There will be more shakeouts in the OEM business - in all sectors - and the surviving firms will be those that can adapt rapidly to new products and adopt the new strategies.

While success will not come easily, the firms that will remain in the business will have a large market to share, because the OEM business continues to grow despite the problems.

They will also have less competition as the smaller firms that could not make the commitment to the long haul will be weeded out. But the remaining competition will be stronger and more aggressive than in the past.

The recession has changed the face of the industry, but it has survived and become stronger in the process. The past years were rough, but the future looks more promising - for those firms that can make it.

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# Despite Inroads, Recession OEM Tape Market Strong

By Edward S. Kinney

Special to Computerworld

The past three years have seen a significant change in the use of magnetic tape in EDP installations. Magnetic tape has retained its position as the major peripheral interchange media on most systems.

Disk files, on the other hand, have achieved prominence in new installations as the primary processing media. However, low performance magnetic tape units have become an essential part of off-line installations, such as keypunch replacement and data capture.

In the processor category, the average number of magnetic tape drives per central processor has diminished, despite the increased number of installations.

## Growth Rate High

The use of magnetic tape equipment used for processing has grown at a rate of 6% to 7% per year. In the off-line usage category, growth has been very much higher, an estimated 25% to 30% per year.

One primary reason for this growth is increased batch processing of data generated on a terminal or keypunch replacement, which can be done conveniently without interrupting the central processor primary function.

Batch processing increases the number of tasks that can be performed by a single processor by the relatively modest investment in the off-line system. Another important factor is the increased use of a high-powered central processor with a multiple number of input stations. Each input station or terminal may include magnetic tape equipment. Time-sharing is an example of this system approach.

Another factor in the growth of magnetic tape usage is typified by off-line preparation of data, preparation of tapes from source documents and using the tape as direct input to the cen-

tral processor.

## Competition Severe

These developments result from several factors. The competitive environment of the OEM market has substantially reduced costs and universal acceptance of the electronically controlled performance ratio has also improved performance.

The improved cost/performance ratio has also contributed heavily to the overall growth of the use of magnetic tape drives in all EDP applications. Growth trend lines have been established, as indicated and most industry participants expect these trends to continue for at least the next five years.

There will be continued growth, at a slow rate, for the high performance, heavy duty magnetic tape transports directly connected to a large central processor. There will be a much higher growth rate for the limited performance, lower cost units used in off-line applications.

## Examine Supplier

An examination of the catalogs of the various magnetic tape equipment suppliers indicates a wide variety of equipment available for OEMs. Some are for use in special applications such as incremental by character.

It is apparent, however, that the growth to capacity ratio of the industry indicates some companies will have hard times during the forthcoming shake-out period.

As a result, the purchaser must critically examine his potential suppliers. Can the supplier support the product over the long term? Does the supplier have the necessary breadth of line to properly supply the needs of the user? What are his test methods and techniques, research programs?

Some of the major suppliers also manufacture plug-to plug compatible magnetic tape drives, which are profitable only with

extensive manufacturing tests and low maintenance costs. This philosophy of test and design is imperative in all successful designs.

## Name of the Game

The name of the game for the user is cost of ownership, not first cost. The user has a difficult chore measuring cost of ownership prior to the purchase and use of equipment.

An early evaluation can show operation, ease of interface design and basic operational characteristics. However, true cost of ownership can be estimated only by thorough examination of the design, breadth of the supplier's equipment line and price/performance ratio.

Reviewing his experience and contacting several users with similar applications are also worthwhile investigations for the OEM.

Markets for OEM magnetic tape equipment will continue to grow despite the occasional tendency of the manufacturer to produce his unit "in house."

Only the large users of a broad line of equipment can support an engineering design section comparable to that of an established OEM supplier. This technology base is imperative to the effective support and evolution of electro-mechanical designs.

The OEM supplier has the added advantages of a larger technology base and higher manufacturing rates. Many of the drives available in today's market are produced in such large quantities that their purchase price is near a prime cost for the OEM equipment user.

A mix of various magnetic tape drives can be purchased under a discount agreement with a favorable price schedule applied to the total number of tape drives from suppliers. This broad technology base and high manufacturing rate bring both operating specification and cost advantages to the user.

Magnetic tape drive equipment

that can read 7- and 9-track NRZI and phase encoded data on the same drive is now available. As recently as 1970, two or more transports would be required. The added cost of multiple drives is significant.

Where 10-1/2-in. tape reels with 2,500 ft of tape have in the past been standard, the user can now select from 600 ft, 1,200 ft or the 2,500 ft capability at a wide range of transfer rates.

The user gains advantageous cost economies by careful selection of the drive he needs for the jobs he has to do. For example, if the amount of data to be captured in a typical operation will not exceed the capacity of a 1,200 ft drive, he can settle for a lower priced 1,200 ft unit.

The OEM market for magnetic tape drives is strong and highly

competitive. Competitive manufacturers are eager to fill the needs of the user with a varied product line to satisfy his requirements. There are varied configurations, speeds, and data packages to make interfacing simple.

Although there have been advances by other moving media memory, magnetic tape remains today the lowest cost and highest reliability interchange media and data capture media.

Newer developments such as high performance digital cassettes and higher speed and density tape units will further increase the use of magnetic tape in the 70s.

Kinney is senior tape product manager for Implex Computer Products Division.

## Marketing to End Users Hard, But Worthwhile

By a CW staff writer

There is no easy way for an OEM manufacturer to get into the end-user market. It has to be a major commitment and dedication of the company with deep personal involvement by the organization starting with the top executive," according to Trude C. Taylor, chairman and chief executive officer of Electronic Memories & Magnetics Corp. (EMM).

EMM has been in the OEM memory market since 1961, and has entered the end-user 360-compatible core market.

"There's a huge market out there. If a company captures even a small percentage of it, the company can have handsome rewards. But the facts of life are quite different than the ones OEM firms are used to dealing with," Taylor said.

"In OEM marketing you have a limited number of customers and you know exactly who they are. You can give that market

in-depth penetration. In addition, the relationship with the customer is largely with the factory, not out in the field.

"The crucial factor in realizing a sale in this market is basically that of the performance versus price and engineer to engineer contact. Not so with the end user. The OEM manufacturer entering this field has to adopt a whole new way of thinking," he said.

## User's Concerns

"Like OEM customers, the end-user's first concern is with reliability of product, services and people," Taylor said. "When he moves a product into his computer system he has to know that it is not going to degrade performance. He wants even better reliability than he had with IBM."

"You have to be able to substantiate your product's performance in the user's environment."

(Continued on Page 3/4)

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## Technological Obsolescence

# User Must Think of the Future in Purchase Decision

By Ronald A. Paterson

**Suicid to Computerworld**  
When the OEM decides which computer to use, he must be prepared to live with that decision over the expected life of his product line, including all expansions and modifications. He is locked into that product because of the high costs associated with development and maintenance of his product.

The OEM's decision, then, is much more than just a simple commitment to purchase. It is an investment that requires not only technical evaluation, but also perceptive business judgment.

A fundamental rule of selling is to learn to think like the prospect does. In this instance, that should not be too difficult, since most OEM manufacturers are OEM buyers. When dealing with an OEM purchaser, the manufacturer would do well to remember his own OEM role with respect to vendors of integrated circuits, PC boards, power supplies, where his purchasing rationale is quite similar to that of his accounts.

The question then is: How to choose between two competing vendors, both of whom are soliciting business.

After determining that the two vendors are offering devices for which the technical specifications are approximately the same, a purchaser becomes concerned with the kind of companies involved.

Are they well-managed and financially sound? Is the probability good that they will still be in business for the remaining life of the product? Is their reputation for on-time delivery good? Do they stand behind their product? Or do they stand way behind their product?

When a buyer secures answers to questions like these, he is in a position to choose a vendor and incorporate that product into his product.

### What OEM Is About

That, really, is what OEM marketing is all about. The seller's product becomes the buyer's product. In the case of small computers, the OEM is, or should be, even more concerned than the systems end-user with questions of reliability, maintenance, training, etc.

The OEM has to live with all of his subsystems, including the processor subsystem, for an extended period of time. As previously mentioned, he is "locked into" the product by his initial choice.

Interface costs, software costs, maintenance and training costs, are steadily climbing. If the OEM makes the right choice of a mini, where costs are coming down, he then sustains these subsystem development and maintenance costs only once. And that is a tolerable burden.

But if he makes the wrong choice, his entire product must be redesigned. And it is the unnecessary duplication of such costs that can drive an OEM to the brink of disaster.

The OEM buyer, much like the manufacturer, is interested in

three areas: architecture, software, and technology.

The pace of technological change continues to be relentless. But if the other two factors can be held relatively constant, then technology becomes the only volatile variable. And that is a far more manageable "mix" than if all three factors are in a perpetual state of flux.

The real payoff to a manufacturer on an OEM account comes after the first year, when the OEM usually buys perhaps three minicomputers, typically, used for laboratory, evaluation and training purposes. The buyer is still in a prototype phase and rather low on his learning curve. Then after that first year he enters into quantity buying.

Now suppose that the small computer manufacturer goes to the OEM, who has purchased 50 processors and has a contract for delivery of another 50, and says: "We are obsoleting the Model XYZ. We now have a much more powerful and cheaper processor to take its place."

The buyer's first reaction is not that this is good news; it is very

menacing news indeed. He smiles briefly, congratulates the mini manufacturer on his achievement, but then asks:

"Will I have to change my software? Will I have to redesign all my peripheral controllers? Indeed, will I have to scrap my product in order to keep up with your product?"

(Continued on Page S/8)

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## Move From OEM Business To End-User Market Hard

(Continued from Page S/2)

This is not something that stands alone, however. It also means reliability of support.

"A quality nationwide sales and service organization is essential so that they respond promptly and fully to the user's needs. Here the customer relationship is not in the factory, but in the field, by on-the-spot sales and service representatives.

"The user wants to be assured that the company he is dealing with has long-term integrity—that it's not just in the market today and out tomorrow," he observed.

"He's got to have continued long-term support with frequent personal contact by the manufacturer. This need involves a much broader base of customer support than is typical in the OEM relationship.

"The end-user's next concern is with flexibility," Taylor added. "You can't be just one product" company as the user does not want to be 'dead-ended.' Every product has a life cycle and you have to be ready to give the user what his changing needs require and what is the best equipment for the job.

"This means a continuing research and development program expanded with market planning people who assess the changing needs of the marketplace and provide the products that fill that need," he noted.

"The end-user supplier can't have false pride about marketing only those products that he has developed in-house. He must continuously seek new products, both internally and externally, in order to meet the marketplace needs. To do otherwise is to build in short-term obsolescence.

"When an OEM supplier has products of reliability and flexibility and backs them up with strong sales and service organizations," Taylor said, "he is then in a position to capitalize on his availability to deliver to the user

improved price/performance."

### Vulnerability

A vulnerability of some end-user companies has been their susceptibility to extravagant sales techniques. "You shouldn't be interested in 'flash' salesmen and sensational records that don't hold up," Taylor said.

"There's been too much of that in this industry. The philosophy should be that you do better if you have integrity in serving your customers over a long period of time."

In addition, Taylor said, "When a company moves in to the end-user's market its management must be fully committed to a balanced program of sales, service, product development and financial responsibility. You must have the resources to take a winning product and push it hard and at the same time be able to quickly drop a loser."

### 'Stakes Reputation'

"Any OEM manufacturer getting into the end-user market stakes the reputation he has built up over the years on his ability to give the user more than he has been getting," Taylor said.

But at the same time, Taylor said an end-user program can balance a firm's OEM growth and contribute greater profits than the OEM market. By combining the two, he said, a firm "can achieve the best of both worlds."

In addition, a firm is probably best to stick with what it knows best, he indicated.

The entry of OEM companies into the end-user market brings to the marketplace products that are tested and skills that have been developed over a period of time, Taylor observed. The know-how that has previously been limited to the benefit of major manufacturers is now open to the computer user.

## Development of 3330-Type Major Disk Market Trend

By a CW Staff Writer

One of the major movements in the disk market has been the development of device like the IBM 3330 unit announced for the 370 family of computers.

Most of the independent disk makers have firmly committed themselves to production of 3330-compatible or 3330-type disk devices and several have already announced products in this area.

Most of the independents feel the OEM market will closely follow the end-user market adopting the 3330-type disk drive on new systems and are gearing their future development for this expected market boom.

### 2314s Still Alive

But at the same time, many foresee the continuance of the 2311- and 2314-type market for several years, at least until the 3330 units are widely accepted in the field.

Several also feel the double

density disks presently on the market will help expand the life of the 2314-type drives for several years even after the 3330 becomes the standard for the industry.

They point out that IBM is trying to get users to stick with the 2314-type drives by offering attractive rental and purchase prices and say, "As long as users are out there" there will be a market for the compatible units.

The advocates of the disk business also think the market will get a boost from the key-to-disk business, which, they feel, is just beginning to penetrate the market base that is now made up largely of keypunch equipment.

While several of the disk manufacturers feel the business will experience a continuing slump for the rest of this year, they see resurgence in early 1972 with the market growing at a rate of 25% a year for several years after that point.



## Test Time Most Critical

# Factors Outlined for Evaluation of New Offerings

By William Buynak  
Special to Computerworld

Of all of the factors contributing to a successful evaluation of equipment to be procured on an OEM basis, time is without a doubt the most critical. Without expending a sufficient amount of time for the evaluation testing, the entire program is reduced to little more than guesswork. This is particularly true for a manufacturer that supplies peripherals with its basic product. Since these products form an integral part of the customer's system, their performance, reliability and quality directly affect the customer's overall impression of the entire system.

In addition, reliability of these peripherals plays a doubly important role. Breakdown of any peripheral may put an entire installation out of service, thereby reflecting on the performance of the company's product. It may also force the price of maintenance to an unequaled level.

Realizing the significance of the selection of a product, the actual evaluation procedure becomes an effective tool in establishing and contributing to the profitability of a company's product line.

One of the key points of the evaluation is planning; a properly planned program will both ensure valid results and keep the costs of the evaluation to a minimum. The program should consist of definition of required characteristics, investigation of manufacturers, selection of no more than three units for evaluation, testing, documentation of results, and finally, selection of the best qualified unit.

### Definition of Characteristics

Defining characteristics is a superficially simple task that should not be glossed over. Only a complete investigation into intended applications, volume levels, desired price ranges, operating conditions and other specifics will permit the definition of minimum required characteristics and a more flexible range of desired characteristics.

These flexible characteristics are the key to the development of a system of trade-offs in certain parameters to achieve desired levels in other parameters.

Typical of such trade-offs is the selection of a higher priced, very high performance device justified by the significant reliability provided.

If this extremely high reliability level could be compromised, a company could trade reliability for price. These same compromises are true for size, styling, serviceability, and speed.

### Investigation of Manufacturers

This second selection step can again save time and cost. The initial surveying of manufacturers' specifications for equipment that conforms to the majority of the defined requirements should be supplemented by an investigation of present users.

Often, weak and strong points of specific equipment can be identified by telephoning users. A telephone conversation with users of one device under consideration revealed that a particular model had been in operation for almost a year, under heavy load conditions, without a single failure.

With the completion of these user surveys, the selection of no more than three products for evaluation testing should be a relatively easy task.

### Evaluation Testing

Up to now, minimal effort has been expended, but the selection has already been limited to three devices which would outwardly conform to the established product requirements. At this point in time becomes the all important factor in the evaluation.

Equipment evaluations might best be conducted on a two part basis: first a two or three day familiarization period which enables test personnel to become familiar with the equipment's operation and allows them to evaluate its ease of operation, and then a minimum of 100 hours of continuous performance test.

This 100-hour test is the single most important factor in determining the validity of the entire evaluation program. Without the investment of this time, one might as well choose an OEM product based on the manufacturer's specifications and not waste those hours spent in selection. As an adjunct to the test period, the establishment of a direct communication channel to the manufacturer's technical staff is also important. The creation of a good rapport with the device manufacturer is necessary to provide prompt action to resolve any technical

problems that may occur.

The performance test itself should be designed to permit the equipment to operate under actual use conditions (at the worst level), at or near the maximum specified limits. This type of performance testing will hasten those failures caused by heat and excessive wear, the two most common causes of equipment failure not usually isolated during the more superficial test programs.

For example, test programs may be developed for a programmable terminal to isolate the weak points by repeated failures.

Repeated failures of a mechanism or circuit discovered during testing will usually bring quick response from the manufacturer when he is informed of them. There is absolutely no sense in disqualifying an otherwise excellent device due to a repeated failure, when the

manufacturer is willing to take corrective action.

Once the testing is in progress, it is imperative that all failures, degradations in operation, and replacements of consumables (printer ribbon, lamps, etc.) be thoroughly documented to permit an accurate analysis of the equipment's operation after the test is completed. Down time, time for repair, and adjustments during operation are all important factors for consideration.

After all tests are completed and the results documented, the evaluation and selection can be made. Once again reference to the trade-offs listed prior to any equipment selection will usually help pinpoint the most desirable product.

Buynak is director of engineering at Compac Corp., which purchases card readers, line printers, etc. for its intelligent terminal.

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## Third Alternative Pushed

# Functional Mini Systems Seen Best for OEM Dollar

By Ken Cheetham  
Special to Computerworld

It is a common misconception among many potential computer users that only two paths exist in the system selection process—the bare-bones components, "shopping list" approach, or the "complete" prepackaged applications, "turnkey" systems approach. But a third alternative, the functional system, offers users greater flexibility, easier maintenance and lower "true" costs than either of the other approaches. The shopping list method involves a potential user seeking out, assembling and implementing his own systems components, usually from a number of different suppliers. It is generally done under an illusion of "significant cost savings" on the assembled system.

The complete systems method gets

deeply involved with a user's process such as typesetting, or cement production, and results in a system designed for essentially one, rather than a variety, of applications. By definition, however, a functional system consists of job-oriented hardware and software designed to perform those functions which a large variety of applications require.

Any data acquisition and control system, for example, performs such standard functions as measuring, counting and controlling physical phenomena whether controlling a radar antenna, cement plant or navigational system. This is because both hardware and software are job-oriented rather than geared to one specific series of applications tasks.

In such a data communications system, man-made data is used and the functions performed can include concentration and

preprocessing of data, message switching, store and forward and so on. The functional approach here provides an integrated system to meet a variety of communications applications requirements.

### Job-Oriented Hardware

To operate effectively, a functional system must include job-oriented hardware and software. Such hardware typically consists of real-time interfaces, in data acquisition, and multi- or single-line controllers, in communications, each designed to perform a variety of interface functions between a user's process, such as handling sensor-oriented data or communications lines, and the processor.

Functional software consists of the real-time operating systems and executives that perform general data acquisition or communications functions, while providing the "hooks" to which specialized applications programs can be attached.

It performs at a level between standard assemblers, compilers, etc. and specialized applications programs, to perform functions common to a wide variety of applications.

### Benefits

As compared with the shopping list approach, this type of system offers a number of user benefits.

First, all system components (hardware and software) are integrated—designed to work together. Systems integration problems are generally anticipated by the vendor and minimized by good design. The user then can begin his specific implementation task from a well thought out, debugged systems base.

Attempting to assemble a system comprised of components from a variety of vendors may appear to satisfy a user's requirements for the components and components costs he thinks best.

But, even after such a systems manager has been assembled, the pieces must be compatible, so that the system will "play." Despite an improving picture of independent vendor compatibility, major problems still exist with maintenance, software, product standardization and system implementation costs.

### Software

System software is provided as part of the system and, being designed to perform with the specific hardware, requires less upkeep, is cheaper to implement and provides greater flexibility than multi-vendor component systems.

Generally, the user of a shopping list approach must develop his own software operating systems (despite the standard operating software and drivers supplied by each vendor), maintain and update his programs based on changes in vendor-supplied interfaces and software, and bear full burden for associated compatibility and cost problems.

Other functional system benefits include:

- Maintenance of an integrated system from one vendor is easier and usually less expensive to maintain than 10 components from 10 different vendors.
- Enhancements are generally less difficult to implement since they are made to work with present functional systems. Changes are developed and paid for by the vendor rather than at the expense of the user.
- Expandability is easier, since such systems are generally available in a variety of functional configurations and future hardware/software requirements, expenses and problems are generally anticipated by the vendor before a system is marketed.

Built-in modular expansion capability is less expensive in the long run and more effective than attempting to expand (especially software) a multi-vendor system designed to meet only immediate needs.

True long-term cost is often less than that of the "lowest price/best performance from each vendor" approach.

Many peripherals may cost less when purchased separately, but to get them to play as a system may cost an extra \$1,000 or \$2,000. The functional system already includes such "integration" costs in its "packaged" price.

Thus, true long-term systems costs, rather than the size of the initial systems investment, should be carefully considered from the start in choosing a functional or bare-bones system.

Ultimately, however, there are instances where a functional system is not practical, regardless of cost savings or other benefits. These generally occur when the job to be performed cannot be done with those systems on the market.

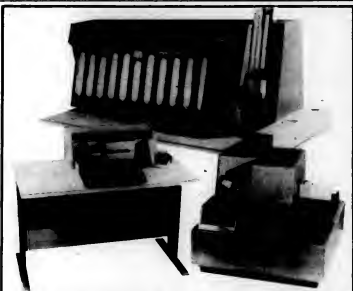
Thus as the involvement in a user's process increases, less reliance should be placed on functional systems to perform the specific application. Instead, the shopping list or complete, prepackaged applications systems should be considered.

A good system prospect for a functional system has a well-defined application he wishes to perform, but desires flexibility for system growth and low costs in the long run.

If the objective is to accumulate a collection of hardware and the associated headaches of system integration, maintenance, software development and recurring expansion, enhancement and implementation costs, the shopping list approach may be most attractive.

If a particular task, regardless of the type application is to be performed efficiently, at an ultimate lower true cost and with allowances for flexible system growth and upkeep, minicomputer-based functional systems offer the best alternatives.

Cheetham is manager of minicomputer competitive analysis at Honeywell Information Systems.



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# IBM 1800



## In the Minkomputer Business

## MOS, Bipolar Memories Compete With Core Units

By Richard Clayton

Special to Computerworld

Since the inception of minicomputers, less than 10 years ago, core memories have been the dominant primary memory medium.

Core has been chosen because, through continued circuit and magnetic developments, they remained the lowest cost, reliable storage available.

In many cases the non-volatile nature of core memories has been used as a method

to retain programs during power down sequences for low-cost systems.

The continuing quest for lower cost and higher performance has led most manufacturers to examine and/or develop a number of alternative technologies for memories.

These include semiconductor storage, bubbles, thin film, plated wire, and even laser based memory systems. Developments have brought semiconductor memories within hailing distance of core for several different applications (and configurations); most of the other technologies are too expensive and not yet sufficiently well developed.

## Semi More Effective

Semiconductor memory systems presently are much more cost effective than core for very small systems (less than 10,000 bits), because their costs are relatively proportional to storage volume while core systems have a very high overhead for the drive and addressing electronics.

Where volatility is a problem it is practical to use semiconductor read only memories in conjunction with a limited amount of read-write semiconductor memory for temporary data.

High performance mini and medium scale computer systems have now switched to semiconductor memory systems to achieve performance goals. Present semiconductor memory chip level access parameters (comparable to core access parameters) vary from below 200 nsec for common MOS (metal oxide semiconductor) to below 75 nsec for densities comparable to the most recent planar core stacks. At the higher speeds density becomes a very important parameter that ultimately limits performance and is a major reason designers of high performance computers will rapidly switch to semiconductor systems soon.

One recent system offers the user his choice of bipolar, MOS, or core memories in a wide range of combinations where bipolar achieves a performance improvement factor of 3 over core.

## Volatility Problem

The question of volatility is handled by one of several different methods, depending on application. In such larger systems,

existing mass storage or lower cost core memory provides program recovery at no additional cost. Power backup is used where it is desirable to retain the total contents of semiconductor memory.

Present semiconductor memories are more cost effective for both high performance and small memory applications. It remains for another round of increased density, lower power, and lower cost semiconductor devices for the present 0.8  $\mu$ sec, 8K core systems to be significantly displaced.

Clayton is product line manager of the PDP-11/45 at Digital Equipment Corp.

## Customers Should Watch for Future

Continued from Page S/3

To be successful, then, the manufacturer supplying the OEM will have to offer systems that are completely compatible, even if they incorporate technological changes. He cannot expect the OEM to completely obsolete his product each time the components are changed.

In the purchase phase of a product development cycle, much thought is given to critical technical parameters and the initial buying price. In all too many cases, not enough thought is given to long-term costs over the expected lifetime of the product line.

That initial product will generate spin-offs and/or become obsolete. Beyond the initial price for hardware, the OEM must consider long-term cost implications of software, debugging, maintenance, training, product upgrading and the like.

Thus, business judgment blends with technical judgment for a "mix" that all OEMs hope and believe combines the best of both worlds.

The outstanding companies in the computer industry - and there are many - do not "sell" OEM accounts so much as they educate them.

Peterson is vice-president for marketing at Interdata, Inc.

## Editor's Note

The OEM industry was edited by CW Computer Industry Editor E. Drake Lundell Jr. Lundell was formerly New York News Bureau Chief for Computerworld.

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## Despite Questions

# Minis Used as OEM System Component

By a CW staff writer

Besides the move to "functional" minicomputers, the OEM computer market has also seen a trend toward "component" computers in the past year—a trend that has caused a number of questions and controversy.

The basic question about such systems is whether they are a new approach in the market or whether they are just "stripped" down general-purpose minicomputers short of important features.

The major advocate of the component approach to the market has so far been Computer Automation Inc., which sells an 8-bit "component" computer.

"This type of system is precisely what it is intended to be, an entirely new computer that gives the OEM systems designer more performance, flexibility and cost effectiveness than he ever dreamed of," according to President David Methvin.

"In this context, this type of unit is as much a component as a junction box or Bakelite switch," Methvin said, "but it is still very much a computer."

## Semiconductor Memory Boom Seen

The embryonic semiconductor memory industry will reach a sales volume of \$187 million by 1975, excluding IBM, according to a study by Creative Strategies, Inc. (CSI).

The largest segment of that market will be computer mainframe and add-on memories, which have traditionally been magnetic cores. Semiconductor memories will have wrestled a majority of the market from cores by 1975, through technical superiority, lower cost, and greater marketability, the research firm said.

Bipolar memories, faster than MOS memories, will be used primarily in applications where access speed is important, such as

Also, price and performance make the device an attractive alternative to specially designed hard-wired circuitry, providing the added benefits of computer reliability and power at lower cost, he claimed.

"After several years of producing minicomputers for the OEM market, we were well aware of the constraints imposed upon the user by the computers produced for this market," Methvin said. "It was evident that conventional OEM minicomputers represented a compromise on everyone's part."

Approaching the problem from the OEM engineer's point of view, it became more and more apparent that the OEM minicomputer should in fact be treated as a component, Methvin said.

"We then designed, developed and produced a system from the ground up, as a component and as a computer."

"Then we packaged it with the OEM engineer in mind, so that it could be mounted in any posi-

tion, upside down, sideways or backward, with easy accessibility for checkout or modification," Methvin said.

The system has no internal wiring, sidestepping the problem of, say, removing a control panel from a wire-wrapped machine so it can be buried in the system hardware.

"This, incidentally, is one good reason why such a machine cannot be a stripped-down computer," Methvin pointed out. "Imagine the problems of stripping off a console and power supply from a conventional wire-wrapped computer."

The architecture incorporates multi-layer printed circuit mother boards, with all internal and external connections facilitated by integral connectors. Power supplies and control consoles, or panels, are designed to be separately functional components, available only if they're needed.

"The OEM buyer who orders 100 minicomputers for integration into his systems doesn't need 100 control panels," Methvin claimed. "He may need five, for checkout purposes, but that's all."

A single plug-in connector unites the system with a control panel for checkout, and plug-in cables link it with the systems control console, to bring out any lights or displays required, and with peripherals and/or expanded core. It is completely interchangeable, Methvin said.

"I've heard it said that this type of system is 'nothing but a control panel,'" Methvin observed. "But I am sure that the unit is a general-purpose computer, which can, of course be used as a controller."

This article presents Computer Automation's side of the controversy over whether systems such as the Naked-Minis are stripped systems or component-computers.

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The program was developed by Dr. Jaime Carbonell of Bolt, Beranek and Newman, Inc., Cambridge, Mass., supported in part by a contract with the Office of Naval Research.

The study is part of a program to foster research in computer-aided instruction to speed up, improve the efficiency and reduce the cost of the technical training of Navy personnel. The unique ability of the Scholar system to initiate a dialogue with the student allows it to serve as a "private tutor" that can adapt to a student's individual background.

A major limitation of earlier systems of computer-aided instruction was that they could only produce a fixed set of questions, usually multiple choice, that were entered in advance. In contrast, Scholar can presently accept anticipated questions or responses, prompt the student, indicate misspellings, and do all of this in acceptable English. It can also generate its own questions based on answers given by the student.

Scholar is different from the conventional computerized teaching system because the structure of its data base, called a semantic network, is a complex network of facts, concepts and procedures in which the units of information are grouped together in terms of their meaning and mutual relationships.

It is also planned to give Scholar the capability to determine, by asking certain questions, a student's previous knowledge, to overcome the problem that arises when a teacher assumes a student knows something that he, in fact, does not. Currently, most computer-based teaching systems handle this problem by starting at a fairly low level of instruction, which leads to a waste of valuable instruction time.

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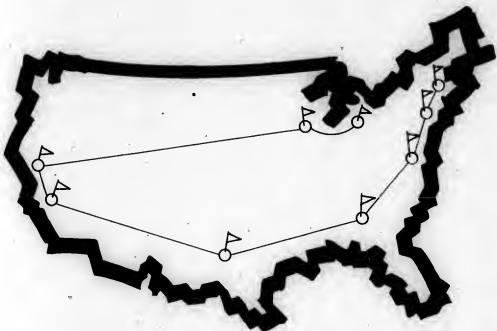
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Along with the normal forms design scale (150, position 1/16" to 1/8", 3/8", 1/2", 5/8", 3/4", 1", 1 1/4", 1 1/2", 1 3/4", 2", 2 1/2", 3", 3 1/2", 4", 4 1/2", 5", 5 1/2", 6", 6 1/2", 7", 7 1/2", 8", 8 1/2", 9", 9 1/2", 10", 10 1/2", 11", 11 1/2", 12", 12 1/2", 13", 13 1/2", 14", 14 1/2", 15", 15 1/2", 16", 16 1/2", 17", 17 1/2", 18", 18 1/2", 19", 19 1/2", 20", 20 1/2", 21", 21 1/2", 22", 22 1/2", 23", 23 1/2", 24", 24 1/2", 25", 25 1/2", 26", 26 1/2", 27", 27 1/2", 28", 28 1/2", 29", 29 1/2", 30", 30 1/2", 31", 31 1/2", 32", 32 1/2", 33", 33 1/2", 34", 34 1/2", 35", 35 1/2", 36", 36 1/2", 37", 37 1/2", 38", 38 1/2", 39", 39 1/2", 40", 40 1/2", 41", 41 1/2", 42", 42 1/2", 43", 43 1/2", 44", 44 1/2", 45", 45 1/2", 46", 46 1/2", 47", 47 1/2", 48", 48 1/2", 49", 49 1/2", 50", 50 1/2", 51", 51 1/2", 52", 52 1/2", 53", 53 1/2", 54", 54 1/2", 55", 55 1/2", 56", 56 1/2", 57", 57 1/2", 58", 58 1/2", 59", 59 1/2", 60", 60 1/2", 61", 61 1/2", 62", 62 1/2", 63", 63 1/2", 64", 64 1/2", 65", 65 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*Exhibitors desiring more information on the Caravan are invited to call Neal Wilder, Dottie Travis, or Charlie Asmus at: COMPUTERWORLD, 797 Washington St., Newton, Mass. 02180 • (617) 332-5606*

## CI Notes

### CalComp Lands BASF Order

ANAHEIM, Calif. — California Computer Products has landed a \$18 million order for 3330-type disk and 3420 type tape systems from BASF. Under the agreement, the IBM-compatible systems will be manufactured by CalComp subsidiary Century Data Systems. The systems will be delivered over a three year period. The new contract expands an existing agreement between the two and BASF primarily will market the units in Western Europe.

### Hitachi-Fujitsu Agreement

TOKYO, Japan — Hitachi and Fujitsu last week reached an agreement for the joint development of a "3.5 generation" of computers to compete with IBM, Japanese sources said.

### Bema Exhibits Increase

NEW YORK — The Business Equipment Manufacturers Association shows here this week is bucking an industry trend with exhibit space up 25% over last year.

Bema attributed the rise in exhibit space to the introduction into the show of computer peripheral equipment and new word processing equipment.

### KLH Drops Injunction Appeal

SAN FRANCISCO — KLH Associates has dropped its appeal of a preliminary injunction granted to International Data Corp. which prohibits the sale of KLH's Computer '70 of New York City. The court had determined the publication was based on the IDC Domestic Installation Data File [CW, May 5].

The injunction will remain in effect until the matter goes to trial later this year.

## Supershorts

Computer Machinery Corp. has restructured its management organization at U.S. headquarters with James K. Sweeney remaining chief executive officer and president. A newly formed corporate staff, operating under the chief executive officer, will be responsible for planning and financial control for all CMC operating companies in the U.S. and abroad.

The Raytheon Service Co. and Terminal Equipment Corp. have signed a contract under which Raytheon will install and maintain Terminal Equipment's terminal systems across the U.S.

Sperry Gyroscope has been named the European distributor for Bright Industries' magnetic tape drives.

TC Systems, Inc. has received a patent for its Processor Expander, which expands a computer's real-time access channel allowing communication with a large number of external devices, the firm said.

Installations of the Friden Division's System Ten business computer have passed "well beyond" the 150 mark, the firm said. The division has a current backlog of 800 orders for System Ten.

## After 4 Years of Delays

# Honeywell Wins Giant Wimmix Award

By E. Drake Lundell Jr.

CW Computer Industry Editor

WASHINGTON, D.C. — After almost four years of delays and confusion, the contract for the World Wide Military Command and Control Systems (Wimmix) has finally been awarded — in a reduced version from the earlier plans.

The award to Honeywell Information Systems is valued at \$51.3 million, according to the Air Force and General Services Administration, which announced the contract.

The contract calls for the delivery of a

minimum of nine systems and the government has an option to acquire 26 additional systems through June 30, 1973, according to Robert L. Kunzig, GSA administrator.

## News Analysis

The systems, which will be in the 6000 series, will range from medium to large depending on the needs of each facility in the huge network, Kunzig added.

The government originally had planned

to purchase standardized computer systems for the entire government command and control network, and the project, calling for the procurement of up to 87 medium to large computer systems, was valued at more than \$250 million by government sources.

### History Outlined

First announced in late 1967, Wimmix was a super ambitious program calling for the installation of new computers at 109 locations around the world, including the National Military Command Systems. At one point the number of computers was estimated as high as 100.

By November, 1969, however, DoD announced a revised plan calling for the acquisition of what it termed "a new family of standardized computer systems" and authorized procurement of a minimum of 34 computers with an option for 53 more.

All the machines were to have been in the medium to large scale range with an estimated cost of \$1 million to \$5 million per system.

The Wimmix contract was to have two major purposes in addition to the primary mission of providing needed computers for the military command and control apparatus: It was to be the first stage in a standardization program under the responsibility of the Joint Chiefs of Staff and it was to foster "extensive competition" among bidders, which would have included peripherals makers.

Originally, 30 bidders were asked to make proposals for the project, which kept being delayed mysteriously by the Air Force, the agency responsible for the new procurement.

Last June a new plan was approved and Deputy Defense Secretary David Packard said the Wimmix project would include the procurement of a minimum of 15 new standardized computers with an option for 20 more.

As part of the standardization effort, IBM's 360 family was established as the second standard. As a coincidence, 16 of the centers in DoD that would be covered by the new standardization effort already had 360 systems on lease.

Depending on an economic analysis of each installation, DoD said then, the currently operated IBM equipment may be purchased, continued to be leased, or replaced with the standard established by the new procurement. All new computers will be provided by the standard established by the WMMCCS competition."

The establishment of IBM as a second standard for the systems had made many government observers fear IBM would have a competitive edge on the Wimmix bid.

It is not clear, however, that the procurement met its stated objective of fostering competition by getting independent peripherals makers to bid on the overall contract.

The Honeywell award calls for HIS to supply all of the peripherals for the system — leaving the peripherals makers without a piece of the pie.

While the contract was still in its formative stages, Richard Caveney of the Computer Peripherals Manufacturers Association had stated that CPMA was planning to protest the award to the General Accounting Office and to congressional committees if necessary.

With the award of the pact to Honeywell, it is clear whether the independent plan to proceed with their protest.

## Nader Charges Postal Service With Fostering IBM Monopoly

WASHINGTON, D.C. — The computer industry and the manner in which at least one semi-government agency handles computer procurement has come under attack from a new source — consumer advocate Ralph Nader.

Nader has charged that the U.S. Postal Service is on the verge of bestowing an "anticompetitive boondoggle" to IBM for a computer-based letter sorting system.

In a letter to Rep. Thaddeus J. Dulski (D-Vt.), chairman of the House Post Office and Civil Service Committee, Nader said the contract might become a huge "financial bonanza" to a corporation that "dominates one of our most important industries."

A contract awarded last February to IBM for improvements to a letter sorting system installed in Cincinnati by LTV ElectroSystems and Plessey Airborne Corp. The original contract with the two firms had been for \$3 million.

The contract, valued at \$4 million, was for improvement of the letter sorting system installed in Cincinnati by LTV ElectroSystems and Plessey Airborne Corp. The original contract with the two firms had been for \$3 million.

Nader said the demonstration of the Letter Mail Code Sorting System would be the prototype of similar systems to be built throughout the country and a national network of such systems could involve an investment of hundreds of millions of dollars.

IBM received the contract to improve the original system without competitive bidding, according to Nader, who noted that since the IBM contract is written on a cost-plus-fixed fee basis it "is subject to potentially unrestrained cost overruns."

In addition, the IBM sole source contract has been amended 12 times and the contract price has risen more than 400% since the first award, Nader said.

### Design National System

One of the amendments, the consumer advocate charged, called for IBM not only to improve the current prototype system but to design the national system of which the mail sorting system would be a part.

"The costly improvement contract now places IBM in a position of designing the prototype for a highly sophisticated system to be built nationwide into which only IBM hardware and software would fit," Nader charged.

Government regulations allow the Postal Service to award sole source contracts only if it can show that the contractor has a unique capability in the area of the

award, Nader noted.

The Postal Service had not shown that special reasons for the IBM award existed, Nader said, and asked the congressional committee to investigate whether politics had influenced the award of the contract.

While the Postal Service admitted IBM was the sole source for the job, it denied the contract was awarded improperly and said that the award was in the best interest of the Postal Service in that it allows for fast and efficient development of the proposed system.

Sources close to the Post Office Committee said it would study the Nader charges and noted the committee had already studied some aspects of the IBM contract.

In his letter Nader noted that IBM controls over 70% of the computer industry and that the Justice Department had filed a suit against the computer maker on anti-trust grounds.

He charged the Postal Service with bolstering the dominant IBM position at the same time another arm of government was attempting to reduce its influence.

## Antitrust Court Seeks DP Data From 2,700

MINNEAPOLIS, Minn. — A firm definition of both the EDP industry and market could result from a study of 2,700 companies undertaken by the federal court here.

In taking preliminary evidence in the antitrust case against IBM (plaintiffs Control Data and Greyhound Computer), the court sent out an order to "members of the industry in one capacity or another," according to Judge Philip Neville.

Some users were apparently included in the lot. The spokesman of one IBM customer, a bank, said his company was "flattered" to be considered part of the industry, and suspected the inclusion on the list stemmed from the bank's financial aid to computer leases.

The bank, in other words, may eventually be deemed the "competition" of IBM. Other recipients said they were "burdened," or "inconvenienced." None were very happy about the unforeseen paperwork.

The order requires data on the last 20 years, including assets, revenues, number of EDP equipment products, as well as EDP expenditures on research and development, customer education, sales and marketing other than advertising, advertising, and promotion by fiscal year.

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## French Moving Up Rapidly in Computer Use, But Still Lag in Several Sections

LONDON — France, Germany and the UK account for more than 65% of the computer installations in Europe, but the French market has been expanding more rapidly than the other two, according to a recent study here.

The rapid expansion in the French market over the past several years makes it equal to the others in terms of the number of computers installed, according to IDC Europa Ltd. Nevertheless, the French market still lags behind the others in "several important areas," the study states.

At the same time, the French market is far more centralized than the other two, with 70% of the computer installations in the Paris area, the report notes, facilitating penetration for the new supplier.

#### 10,000 Analyzed

In an analysis of more than 10,000 installations, the firm found France has a far higher

proportion of card-only installations and installations with small core size (less than 16K) than either Britain or Germany.

In addition, the average values of the installations in Britain and Germany were 5% and 12.5% higher respectively, than their French counterparts.

"In areas where domestic manufacturing patterns have not held her back, France has readily accepted more sophisticated technologies," the report states.

The French are more willing to accept key-to-tape, key-to-disk, and OCR equipment than any of her European neighbors, IDC Europa said.

The French market is one "with enormous unfulfilled potential," the study said. But, it notes, this potential is "undoubtedly beginning to be realized as the earlier Bull computers fall into disuse. Certainly the French National Plan for computing is one of the most detailed in Europe."

The national plan will "continue to expand the French market at an above average rate" in the near future. "Whether it can do the same for the domestic industry — CII — is another matter," the study observes. "It is hard to see how CII can hope to strengthen its challenge outside of the public sector."

## U.S. World Trade Position Under Fire: Anderson

LOS ANGELES — Efforts to stifle technological progress pose a major and immediate danger to the ability of the U.S. to compete successfully in the world market, Robert Anderson, North American Rockwell Corp. president, said recently.

The import from Europe of high technology products is increasing at a 20% rate, while the rate of growth in their export from the U.S. averages only 9%, he said.

"While U.S. imports from Japan were growing at a rate of 32% a year, U.S. exports to Japan were increasing at only 7% a year," Anderson said.

#### Trade Deficits

Current estimates indicate that, in high technology items alone, the U.S. will suffer a trade deficit of almost \$2 billion with Europe and almost \$5 billion with Japan in 1973, unless the present trend is reversed, he observed.

"There is no question that we are fast losing the momentum that in the past has let us compete successfully in the world market on the basis of our superior technology, despite our higher wage scale.

"It is most unfortunate that just as many of our industries are being threatened by the rapidly rising productivity of competitor nations, we appear to be anxious to slow the kind of technical effort that pushed us to the forefront," Anderson said.

"There is nothing wrong with re-ordering priorities. It's healthy, and it is part of our national strength that we can change as times and needs change.

"The danger is in over-reaction, in trying to move too fast and too precipitously, and to lose sight in the meantime of some of our real strengths," Anderson concluded.

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## Five Systems Announced

# Mohawk Maps Entry Into OEM Minicomputer Area

ST. PAUL, Minn. — Mohawk Data Sciences Corp. (MDS) has entered the OEM minicomputer market with five models from its Atron subsidiary here.

The five new systems include four in the 500 series, the 501, 550, 560 and 570, and the 600 series of microprogrammed controllers.

The Atron 501 is the basic processor including binary arithmetic, operator control panel, two direct memory access channels, four buffered I/O channels, memory parity, memory power protect, sequential editing, decimal arithmetic, and I/O expansion capability up to four external I/O channels.

The base single unit price for the 501 is \$7,150. Memory for the Atron 501 is sold in 4K byte increments at \$1,250 per increment or 8K byte increments at \$2,500 per increment up to 32K bytes maximum.

The 550 Processor incorporates

the basic Atron 501 and is designed for I/O processing and program development.

The base price for the 550 is \$9,925 which includes the processor, cabinet, one I/O external channel, and a systems console for a programming aid, such as inspect and change. Memory is sold in 4K- or 8K-byte increments to 32K bytes maximum.

The 560 Concentrator is designed for the OEM who desires

multiplexing and automatic call-

ing capability. The 560 will control up to 32 slow-speed channels, Atron said.

The base single unit price for the 560 is \$11,950 and includes the standard 501, large cabinet, terminal console, technical control panel, utility adaptor, one external interface and the communications multiplexer that controls up to 32 communications lines and will operate up to eight RS-232 compatible modules. Additional RS-232 com-

patible modules are extra. Memory is the same as in the Atron 501. The auto calling unit controller cost is \$450 for a single line and \$250 for each line up to a total of eight lines.

The 570 is a remote batch terminal processor priced at \$13,500. It includes the standard Atron 501, cabinet, terminal console, technical control panel, utility adaptor, one external I/O interface, integrated card reader and printer adaptors,

and a half-duplex synchronous communication channel.

The Atron 600 Series processors are microprogrammed controllers which let the OEM select, from a set of standard, pluggable card assemblies, a programmable controller shaped to fit his particular applications.

The 600 series has a 260 nsec processor, 200 nsec program memories, and 1  $\mu$ sec main memories.

## Recession Hurts UK DP Business, Imports Hit Hard

By Joseph Hanlon

Special to Computerworld

LONDON — The computer recession continues to deepen here. Computer deliveries, orders, and employment are all at the lowest point in at least a year, according to the Department of Trade and Industry (DTI).

Foreign manufacturers, particularly American, have been even harder hit than British manufacturers.

Computer industry employment in the UK hit a peak of 52,400 last December and has been falling ever since. The Oct. 12 DTI report listed June 30 employment as down only 900 from the peak, but there have been massive layoffs since then.

In August ICL cut 1,800, 10% of its manufacturing work force and NCR recently dismissed 1,200 computer and business machine workers. Many smaller companies have also made cuts. The total orders on hand for new computers and peripherals as of June 30 was the lowest in over two years: 675 million. Combined deliveries of UK built and imported equipment fell to \$156 million during the second quarter, according to the report.

### Imports Down 40%

Although British manufacturers have been hard hit, foreign manufacturers marketing here have been struck an even bigger blow. Second quarter deliveries of UK built equipment were only 20% below the peak quarter last year, but imports were down 40%.

The only hopeful sign in the DTI report is that research and development work has remained constant for the past year and not dropped with production.

As defined by the DTI, computer equipment includes computers, data transmission equipment, and peripherals. Research and development and telecommunications links are not included.



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The 7900 uses both a fixed disc and a 2315 type cartridge which can be changed in less than one minute. The dual disc configuration allows additional data stored off-line to be placed on-line fast. And it also enables data and programs to be duplicated for back-up capability on a single drive.

Rugged design ensures that heads stay directly over data even during severe shock, vibration, pitch or roll. For instance, the 7900's photo-optical positioning components are bolted to precisely milled surfaces on a single main base casting. Its servo system has a stiffness of 10 pounds per mil. The temperature specification is tough: 50°F to 104°F. It's those kinds of features

which are your guarantee that data written on one 7900 can be read on another. With complete reliability.

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For instance, there's our new 1600 CPI 7970E Digital Magnetic Tape Unit with speeds of up to 45 ips. It has built-in value features like phase encoded data electronics, including error correction and detection circuitry. All in a compact 24-inch high transport.


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## Recession Over?

# Honeywell, Burroughs Report Improved Quarters

It appears that the computer industry — or at least the sector comprised of the remaining large mainframe makers — has weathered the recession, with both Honeywell and Burroughs joining IBM in reporting increased earnings for the third quarter.

While IBM's third quarter increase was slight (CW, Oct. 20), the gains reported by both of the others were more dramatic. Honeywell said third quarter profits were almost double those of a year ago, while Burroughs reported a 10% increase in earnings for the period.

For Burroughs the third quarter boosted the entire first nine months to a 10% gain, while Honeywell had lower nine

month results despite the third quarter loss.

In the three months ended Sept. 30, Burroughs registered earnings of \$12.7 million, 69 cents per share, on revenues of \$214.9 million compared with earnings of \$11.5 million, 67 cents per share, on sales of \$216.8 million in the same period a year ago.

Also in the third quarter, Honeywell said profit before taxes amounted to \$115.2 million, 86 cents per share, up from \$8 million, 46 cents per share, in the same period a year ago.

After extraordinary gains from tax benefits and loss carry-forwards, income rose to \$16.5 million, 94 cents per share, from

\$8.6 million, 40 cents per share, a year ago. Total revenues reached \$476.6 million, compared with \$459.7 million a year earlier.

In the first nine months of 1971, Burroughs reported net operating earnings of \$40.5 million, \$2.21 per share, compared with earnings of \$36.9 million, \$2.14 per share, in the first three quarters of 1970.

Revenues for the period jumped to \$648.7 million, up 5% from \$619.6 million in the same period last year.

At Honeywell, profits for the nine month period before tax credits amounted to \$30.4 million, \$1.74 per share, down from \$36.8 million, \$1.87 per share, in the same period last year. The firm had tax credits of \$2.3 million in the 1971 period and \$548.000 in the 1970 period, bringing income to \$32.7 million and \$37.3 million respectively.

In the nine months, total revenues dropped to \$1.37 billion from \$1.41 billion a year earlier. Increase in Orders

At Burroughs, incoming world-wide orders in the third quarter increased 9% compared with the same year earlier period and orders for the first nine months were up 7% from 1970, according to Ray W. Macdonald, president.

**EMM Shows Third Quarter Up, But Foresees Decline**

LOS ANGELES, Calif. — Electronic Memories and Magnetics Corp. reported increased earnings for the third quarter and static nine month earnings, but indicated it expects to show a loss in the fourth quarter.

Earnings in the third quarter reached \$618,000, 7 cents per share, after preferred dividends on sales of \$21.4 million, compared with a loss of \$531,000, 15 cents per share, on sales of \$21.4 million in the same 1970 period. For the first nine months of 1971 the firm had earnings from continuing operations of \$1.7 million, 18 cents per share, on sales of \$62.7 million compared with earnings of \$1.7 million, 18 cents per share, on sales of \$64.7 million in the same period in 1970.

Chairman Trude C. Taylor stated the third quarter results were below management's expectations and the company is now forecasting an operating loss during the fourth quarter.

Sales during the fourth quarter are expected to be down approximately 10% compared with the third quarter, he said.

Orders in the U.S. have "shown a very strong pick up in the weeks following President Nixon's new economic program as users anticipated the approval of the proposed investment tax credit," Macdonald said.

Orders from overseas operations are strong everywhere except in the UK, which has been affected by the post-decimalization period, he observed.

The worldwide backlog for commercial products at the end of the nine-month period was

16% higher than at the beginning of the year, but government consumer products backlog declined 28% during the same period, Macdonald said.

At Honeywell, Chairman James H. Binger said computer business "accelerated in the third quarter, especially in the U.S.," but noted the firm would have difficulty in matching last year's total results.

Honeywell had an increase in outright sales and conversions of leases to sale in the third quarter, he noted.

## Intel Expects Flat Third Quarter, Slump In Fourth

NEW YORK — "Intel Corp. will report flat earnings for the third quarter, ended Sept. 30, and will probably be in a deficit position for the fourth quarter and the first quarter of 1972," according to Peter S. Redfield, president.

"Our near term earnings difficulty can be attributed to two specific problems: one internal and the other external," Redfield told security analysts here.

"Internally, our information products division, the former Telecommunications Systems, which we acquired in 1970, has not yet produced the profits we hoped would be forthcoming."

"Although sales have increased, our expansion of the division's marketing capability, the development of new products, and the transfer of our manufacturing facilities... will postpone the earnings outlook until 1972," he said.

"The external problem," Redfield said, "is a direct result of the relationship between Information Storage Systems, the disk drive manufacturer Intel acquired early this year, and its major customer, Telex Corp."

"In June, Intel announced plans to market directly to the end user a double-density disk drive. However, through an injunction... Intel has been temporarily prohibited from entering this marketplace. To date, Intel has not yet ordered any of these drives, and this has hurt us."

On the more positive side, Redfield said that Intel's data processing division and leasing activities have been doing well and that profits in these areas were better than 35% ahead of last year.

"Success in the independent peripherals industry," Redfield added, "depends on four factors: a company's ability to be vertically integrated, i.e., to have control of design, manufacturing and marketing; a company's ability to be a leader in product

development — this means the ability to spend at least \$5 million in R&D annually; and, of course, the ability to finance that growth by raising between \$50 and \$75 million annually to support its programs."

"No one in the independent peripheral industry has this description yet," he added.

## Nickels & Dimes

Booths Computer Corp. has completed arrangements for a \$52 million secured credit with fourteen banks headed by the Bank of America. The loan, which carries an interest rate of 1% over the Bank of America's prime rate, will be used to retire the firm's original revolving bank credit and its installment purchase agreements with IBM.

SSS  
Analytical Systems Inc. has agreed to use the United Press International financial data base in providing a new portfolio appraisal service.

SSS  
The boards of University Computing Co. and Computer Technology Inc. have approved the proposed merger of CT into UCC in a tax free transaction.

SSS  
Optical Scanning Corp. will adopt the accounting method recently recommended by the Accounting Principles Board of the American Institute of Certified Public Accountants for recording fiscal results for third-party leasing programs. The change will result in spreading the revenue end expense of a lease over the entire term of the lease.

SSS  
Microform Data Systems Inc. has sold \$500,000 of 8% notes due June 15, 1972 to 10 of the investors who purchased \$2.6 million of 5 year convertible notes with warrants sold on March 2.

SSS  
Rockwood Computer Corp. indicated about \$2.8 million of the 5-1/4% debentures and \$440,000 of the 5-1/2% units were converted during the period when conversion prices were reduced.

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## TRADE QUOTES

Computerworld  
Stock Trading Summary

CLOSING PRICES THURSDAY, OCTOBER 21, 1971

E K C H	RANGE	107 (1)	CLOSE OCT 21	WEEK CHNG	WEEK PCT	WEEK CHNG

## SOFTWARE &amp; EDP SERVICES

O ADVANCED COMP TECH	1-4	1 1/2	1 1/2	-1/8	-6.2	
A APPLIED DATA RES	5-13	5 1/2	5 1/2	-1/8	-3.2	
O APPLIED LOGIC	1-4	1 1/2	1 1/2	-1/8	-20.0	
N AUTOMATIC DATA PROC	14-18	6 1/2	6 1/2	-2 1/2	-3.9	
O AUTO SCIENCES	1-8	1 1/2	1 1/2	-5/8	-35.7	
O COMPUTER NETWORK	2-11	6 1/2	6 1/2	0	0.0	

O COMPUTER PROPERTY	5-11	5 1/2	5 1/2	-1/2	-8.3	
N COMPUTER SCIENCES	8-17	7 1/2	7 1/2	-1/4	-3.2	
O COMPUTER TECHNOLOGY	5-11	8	8	-7/8	-12.7	
O COMPUTER USAGE	5-16	7 1/4	7 1/4	+1/4	+5.6	
O COMP AUTOMAT REPAIRS	6-13	7 1/4	7 1/4	-1/2	-6.0	
N COMPUTER & SOFTWARE	21-45	21 1/2	21 1/2	-1/2	-2.2	

O CONNESS	2-4	1 5/8	1 5/8	-1/8	-18.7	
O CONHANE	1-4	4 5/8	4 5/8	0	0.0	
O DATA AUTOMATION	1-4	3 1/4	3 1/4	-1/8	-6.2	
O DATA PACKAGING	6-10	7 1/4	7 1/4	0	0.0	
O DATA/INFORMATION SERVICE	1-3	1 1/2	1 1/2	0	0.0	
L DATAPAC	4-10	7	7	+3/4	+12.0	

O EDP RESOURCES	7-18	8 5/8	8 5/8	-1/4	-3.5	
A ELECT COMP PROD	2-7	2	2	-1/8	-11.9	
N ELECTRONIC DATA SYS.	45-85	45 1/4	45 1/4	-1/8	-3.3	
O INFORMATIONICS	7-15	7 1/4	7 1/4	-1/8	-15.9	
O J.O.A. DATA CORP	1-4	1 1/2	1 1/2	-1/8	-10.0	
A ITEL	7-23	7 1/8	7 1/8	-5/8	-8.0	

O KEANE ASSOCIATES	4-14	5 1/2	5 1/2	-1/2	-8.3	
O KEYDATA CORP	7-14	6 5/8	6 5/8	0	0.0	
O MANAGEMENT DATA	6-13	8 1/2	8 1/2	-1/4	-4.8	
O NATIONAL CSS INC	7-14	7 1/4	7 1/4	-1/4	-3.3	
O PAY COM ANALYSIS	6-13	8 1/2	8 1/2	-1/4	-12.5	
P ON LINE SYSTEMS INC	7-18	10	10	0	0.0	

N PLANING RESEARCH	13-26	13 1/2	13 1/2	-3/4	-5.2	
O PROGRAMMING METHODS	17-29	17	17	0	0.0	
O PROGRAMMING & SYS	45-85	45 1/4	45 1/4	-1/8	-3.3	
O SCIENTIFIC COMPUTERS	2-4	2 5/8	2 5/8	-1/4	-4.5	
O SIMPLICITY COMPUTER	1-4	5 1/2	5 1/2	-1/4	-3.3	
O SOFTWARE SYSTEMS	1-4	3 1/8	3 1/8	-1/8	-12.5	

O TAS COMPUTER CENTERS	9-15	5 5/8	5 5/8	-1	-14.8	
O TOLLEY INTL CORP	1-8	6	6	+1/4	+2.1	
N TRACOR COMPUTING	2-4	2 5/8	2 5/8	-1/8	-5.5	
O TYMSHARE INC	4-15	8 1/2	8 1/2	0	0.0	
O UNITED DATA CENTER	2-7	5 5/8	5 5/8	0	0.0	
N VENTURE COMPUTER	20-38	20 1/4	20 1/4	-1/4	-4.8	

A URS SYSTEMS	8-11	6	6	-5/8	-8.4	
O VORTEX CORP	2-8	5 5/8	5 5/8	+1/4	+4.5	

## PERIPHERALS &amp; SUBSYSTEMS

N ADDRESSOGRAPH-HULT	24-48	34 1/8	34 1/8	-1 1/2	-4.2	
O ALPHANUMERIC	1-6	3 1/8	3 1/8	-2 1/4	-4.8	
N AMECOR CORP	11-25	14 1/4	14 1/4	-1/4	-3.3	
O ANDERSON JACOBSON	6-10	5 1/2	5 1/2	-3/4	-12.0	
O ATLANTIC TECHNOLOGY	5-8	5 1/2	5 1/2	-1/8	-13.3	
A BOLT, BERANKE & NEW	9-15	4 5/8	4 5/8	-7/8	-7.3	

N BUNKER-RAND	7-17	7	7	-1/4	-3.4	
A CALCOMP	16-33	15 3/4	15 3/4	-1 3/8	-8.0	
O COMINTRONICS	2-4	2 1/4	2 1/4	-1/8	-10.0	
O COLORADO INSTRUMENTS	2-8	2 1/8	2 1/8	-1/8	-5.5	
O COMPUTER CROUCH	6-19	7 1/4	7 1/4	-1/2	-6.4	
A COMPUTER EQUIPMENT	3-7	3 3/8	3 3/8	+1/8	+5.8	

A COMPUTER	5-10	5 1/2	5 1/2	+1/8	+2.3	
O CONSOI COMPUTER LTD.	2-12	2	2	-1/8	-5.8	
A DATA PRODUCTS CORP	4-10	5 1/2	5 1/2	-1/4	-6.0	
O DATA RECOGNITION	2-4	8 5/8	8 5/8	0	0.0	
O DATA TECHNOLOGY	5-9	5 1/8	5 1/8	-1/8	-26.4	
O DIGITRONICS	2-4	1 1/2	1 1/2	-1/4	-16.7	

N ELECTRONIC M & H	6-16	6 5/8	6 5/8	-1	-13.5	
O FABRI-TEX	2-4	2 5/8	2 5/8	-1/8	-4.0	
O GENERAL COMPUTER SYS	6-10	8 1/4	8 1/4	-1/4	-2.7	
N GENERAL ELECTRIC	51-74	58 1/4	58 1/4	-1 7/8	-4.0	
O INFOTEK INC	20-49	22 1/4	22 1/4	-3 1/2	-13.3	
O INFORMATION DISPLAYS	1-8	1 1/2	1 1/2	-1/8	-16.7	

O MANAGEMENT ASSIST	1-2	5 5/8	5 5/8	-1/8	-15.6	
A MARSHALL INDUSTRIES	11-27	10 5/8	10 5/8	-1/8	-1.1	
N MEMOREX	27-38	30 1/4	30 1/4	-3/4	-2.3	
A MILO ELECTRONICS	12-18	14 1/2	14 1/2	-1 1/8	-7.2	
N MONHAW DATA SCI	21-37	21 1/8	21 1/8	-1/8	+0.5	
O OPTICAL SCANNING	7-18	8 5/8	8 5/8	-3/8	-5.2	

O PHOTON	7-12	7	7	-1/2	-6.6	
A POTTER INSTRUMENT	13-25	14 5/8	14 5/8	-1/8	-2.5	
O PRECISION INST.	7-16	13	13	+2	+19.1	
O RECOGNITION EQUIP	12-18	12 1/2	12 1/2	-1/8	-6.7	
O RECORDER CORP.	1-4	1 1/8	1 1/8	-1/8	-6.2	
N SANDERS ASSOCIATES	10-22	10 1/2	10 1/2	-1/2	-4.5	

## SUPPLIES &amp; ACCESSORIES

N ADAMS-HILLIS CORP	12-19	11 1/2	11 1/2	-1/2	-4.1	
O SALTRENE BUS FORMS	6-10	8 1/4	8 1/4	-1/4	-2.9	
O SARRY WRIGHT	2-4	7 1/8	7 1/8	-1/8	-6.3	
A DATA DOCUMENTS	15-19	15 1/8	15 1/8	-1/8	-5.8	
O DUPLEX PRODUCTS INC	6-11	14 1/2	14 1/2	-1/4	-1.1	
N ENNIS BUS FORMS	6-10	8 5/8	8 5/8	-1/4	-5.8	

E K C H	RANGE	107 (1)	CLOSE OCT 21	WEEK CHNG	WEEK PCT	WEEK CHNG

N NASHUA CORP	29-47	46	46	-5/8	-1.3	
O REYNOLDS & REYNOLDS	37-63	60 1/2	60 1/2	-1	-1.6	
O STANDARD REGISTER	16-23	16 3/8	16 3/8	+1/8	+0.7	
O TAB PRODUCTS CO	8-17	15 3/4	15 3/4	+1/4	+0.5	
N UNICO	25-34	26 1/4	26 1/4	-1/8	-0.4	
A WARASH MAGNETICS	6-10	5 1/2	5 1/2	-5/8	-10.2	
N WALLACE BUS FORMS	18-26	20 1/4	20 1/4	-1 7/8	-8.4	

## COMPUTER SYSTEMS

N BURROUGHS CORP	105-153	153	153	-3/8	-2.9	
N COLLING RADI CO	16-20	12 1/4	12 1/4	-1/4	-3.0	
N CONTROL DATA CORP	59-85	80 5/8	80 5/8	-3 1/4	-7.4	
O DATA GENERAL CORP	16-25	25 5/8	25 5/8	+1/8	+0.5	
O DIGITAL COMP CONTROL	4-24	14 3/4	14 3/4	-2 1/2	-14.4	
N DIGITAL EQUIPMENT	53-85	67 1/8	67 1/8	-2 1/8	-3.0	

N ELECTRONIC ASSOC.	5-9	4 7/8	4 7/8	-5/8	-11.3	
A ELECTRONIC ENGINEER	5-9	7 3/4	7 3/4	-5/8	-6.7	
N FOXBORO	25-48	37 1/4	37 1/4	-1 3/4	-4.4	
O GENERAL AUTOMATION	5-9	2	2	-1/8	-4.0	
N HEMLETT-PACKARD CO	30-48	43 3/4	43 3/4	-2 1/2	-5.6	
N HONEYWELL INC	85-115	111 7/8	111 7/8	-1 7/8	-0.1	

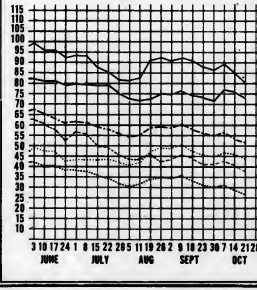
N IBM	284-354	304	304	-5 1/4	-1.2	
N VARIAN ASSOCIATES	15-18	15 1/8	15 1/8	0	0.0	
N NCR	30-49	30 1/8	30 1/8	-1/8	-1.2	
N RAYTHEON CO	27-46	35 1/4	35 1/4	-1 1/8	-3.0	
N SPERRY RAND	25-38	24 3/4	24 3/4	+1/8	+0.5	
A SYSTEMS ENCL. LABS	8-18	8 3/8	8 3/8	-5/8	-6.9	
N TATACON	15-18	15 1/8	15 1/8	0	0.0	
N VICTOR COMPUTOMETER	14-27	14	14	-3/8	-2.6	
N WANG LABS	20-34	34	34	-3 5/8	-9.6	
N XEROX CORP	85-121	110 1/2	110 1/2	-3 1/2	-2.5	

## LEASING COMPANIES

A SGOOTHE COMPUTER	13-27	33 3/4	33 3/4	-2	-12.6	
O GRESHAM COMP.	2-4	2	2	-1/4	-11.1	
O COMPUTER EXCHANGE	3-9	2 7/8	2 7/8	-1/8	-4.1	
A COMPUTER INVESTOR CORP	8-14	1 1/2	1 1/2	-1/8	-10.5	
N DATA PROC. F & B	11-19	10 7/8	10 7/8	+1/8	+1.1	
O ELECTRONIC RENTAL	2-4	3 7/8	3 7/8	-1/4	-6.5	
A OCL INC	5-13	7 3/4	7 3/4	+1/2	+7.1	
A OLEARSON-STORM	24-45	40 3/4	40 3/4	-1 3/4	-4.1	
A DPA, INC.	8-9	8 1/4	8 1/4	-3/4	-8.5	
N LEASITE MGT	7-11	1 1/4	1 1/4	-1/4	-2.4	
A GREYHOUND COMPUTER	7-11	7 1/4	7 1/4	-1/4	-3.1	
N LEASCO CORP	16-26	23 5/8	23 5/8	-1 1/2	-6.0	

O LECTRO MGT INC	2-5	4	4	+1/2	+14.2	
O NCC INDUSTRIES	5-8	8 5/8	8 5/8	-1/4	-2.8	
A ROCKWOOD COMPUTER	4-9	9	9	-1/4	-5.0	
O SYSTEM CAPITAL	2-4	2 1/4	2 1/4	-1/8	-8.5	
N U.S. LEASING	16-19	34 1/4	34 1/4	-1 3/8	-3.8	

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE  
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER  
P=PRIME-1/8% WASH  
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID  
(1) TO NEAREST DOLLAR

Earnings  
Reports

S R E R D	1971 (000)	1970 (000)	1971 EPS	1970 EPS

Shr End	2,081,548	1,927,000	\$2.31	\$2.27
Earnings	266,918	259,893		
9 Mo Shr	5,892,485	5,508,499	\$4.51	\$4.31
Revenue	5,892,485	5,508,499		
Earnings	772,827	742,722		

S R E R D	1971 (000)	1970 (000)	1971 EPS	1970 EPS

Shr End	823,300	817,900	\$1.17	\$1.17
Revenue	871,500	817,900		
Spec Chg	9,500	4,700		
Op	250,000	231,000		
Earnings	(231,000)	14,000		
9 Mo Shr	2,560,500	2,291,700	\$2.44	\$2.34
Revenue	2,560,500	2,291,700		
Spec Chg	250,000	51,400		
Op	187,800	51,400		

a-Related, b-Based on income before special items, c-Related to withdrawal from the general purpose computer file.

S R E R D	1971 (000)	1970 (000)	1971 EPS	1970 EPS

Shr End	84,209	8,025	\$2.05	\$2.05
Revenue	17,784,277	19,025,994		
Earnings	489,952	146,776		
9 Mo Shr	277,137	268,168	\$3.48	\$3.48
Revenue	37,071,020	40,681,962		
Earnings	943,384	570,474		

a-Based on income before tax credit, b-From tax loss carryforwards, c-Equal to 16 cents a share in the quarter and 30 cents a share in the half.

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# Epoch 4 cuts handling damage 50%.



## How does that grab you?

Nine out of ten dropouts are caused by handling damage. Squeezed flanges. Dropped reels. Improper mounting. Plain carelessness.

So how can Epoch 4 reduce handling damage 50% or more? Because its unique new binder system bends without breaking. And stretches without cracking. So Epoch 4 can take the kind of handling that would ruin a conventional tape.

We don't promise Epoch 4 will eliminate all handling

damage. No tape can do that.

But, because Epoch 4 is 80 times tougher than conventional tape, it can easily reduce dropouts 50% in the average installation.

Is this kind of performance worth a few dollars extra per reel? You bet it is.

Think about how much handling damage is costing you every day.

Then grab onto Epoch 4. You'll never let go.



**GRAHAM  
MAGNETICS**

Graham, Texas 76046